

PERIODICAL ROOM  
GENERAL LIBRARY  
UNIV. OF MICH.

# DISCOVERY

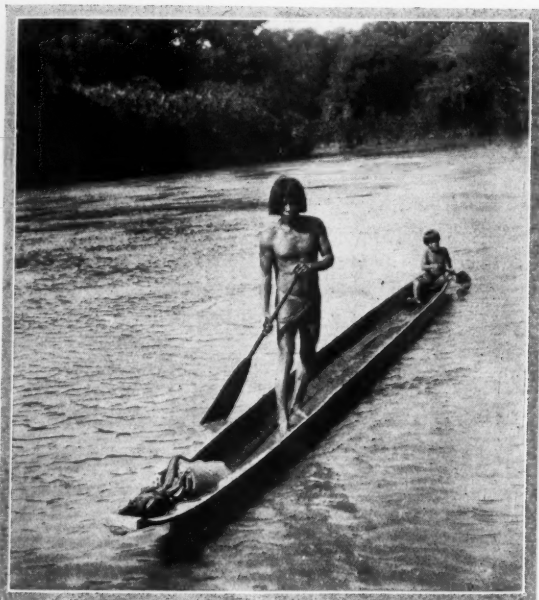
A Monthly Popular Journal of Knowledge

Vol. VIII, No. 95. NOVEMBER, 1927. PRICE 1s. NET

Including the connexions of

**MODERN SCIENCE** <sup>1½</sup>  
*Incorporating CONQUEST*

A Magazine of Progress, Invention & Discovery



CHOCÓ INDIANS IN PANAMA.  
(See the new Swedish expedition report, page 347.)

## CONTENTS.

	PAGES
Editorial Notes ... ..	345
The Chocó Indians ... ..	347
North Elmham Cathedral ... ..	351
A Zoology Congress ... ..	354
Bird Census in the Alps ... ..	357
"Central Heat" for Crops ... ..	360
Invisible Music ... ..	363
Shakespeare and the Stars ... ..	365
Sir Arthur Shipley ... ..	366
The Beaver in Canada ... ..	368
Broadcasting and the Press ... ..	370
A Cretan Statuette ... ..	372
Among the Stars ... ..	374
Book Reviews ... ..	375

*Efficiency first*

Call or write for folder  
"D" which gives full particulars  
of the Remington  
Portable Typewriter.



The Remington Typewriter Co., Ltd.  
Head Office: 100, GRACECHURCH STREET, LONDON, E.C.3.  
Showrooms: 83, Regent Street, W., 4, St. Paul's Churchyard, E.C.4.  
Branches in principal Provincial Centres.

**Miss Remington**

says—"The World's finest Portable  
Typewriter—the Remington—is  
assembled by BRITISH LABOUR in  
the LONDON FACTORY of the  
Remington Typewriter Co., Ltd."

**£2:2:0 with order**  
The balance can be paid by  
eleven monthly payments  
of £1.

CASH PRICE - £12:10:0

# BENN'S SIXPENNY LIBRARY

EDITED BY WILLIAM ROSE, M.A., Ph.D.

Every volume in this series is a full-length book by a leading authority, printed in readable type on opaque paper, and sold at sixpence net. When the first six volumes were published, in editions of 10,000 each, three had to be reprinted within a week and the remaining three within a fortnight. The London County Council have added several of the volumes to their requisition list for schools; teachers and educational authorities all over the country have seized this opportunity of obtaining, for themselves and their pupils, reference books of such unimpeachable authority at so small a price.

In view of the exceptional measure of public support it is proposed to extend the Sixpenny Library to cover every branch of human knowledge and activity, so providing a complete reference library to the best modern thought at a price within reach of everyone. Whatever subject you are interested in, there will be a volume for you. You are invited to read through the list of titles below and to place your order for those which interest you, whether for your own reading or for use in school. Orders may, of course, be placed with any bookseller. You are also asked to send us any suggestions for new volumes, in short to co-operate in building up the series and making it known in every institution throughout the country.

## COMPLETE LIST OF TITLES NOW READY

(Numeral in brackets represents series number)

- A HISTORY OF ENGLAND. *By* David Somervell, M.A. (1).  
 ROMAN BRITAIN. *By* Gordon Home. (4).  
 ITALIAN LITERATURE. *By* Professor Edmund Gardner, M.A., Litt.D. (53).  
 SHAKESPEARE. *By* G. B. Harrison, M.A. (54).  
 MODERN SCIENTIFIC IDEAS. *By* Sir Oliver Lodge, F.R.S. (101).  
 THE AGE OF THE EARTH. *By* Arthur Holmes, D.Sc., F.G.S. (102).  
 THE ATOM. *By* Professor E. N. da C. Andrade, D.Sc. (103).  
 CHEMISTRY. *By* Percy E. Spielmann, Ph.D., F.I.C. (104).  
 RELATIVITY. *By* James Rice, D.Sc. (105).  
 THE EARTH, THE SUN AND THE MOON. *By* Professor George Forbes, F.R.S. (106).  
 THE MIND AND ITS WORKINGS. *By* C. E. M. Joad, M.A. (152).  
 THE DEVELOPMENT OF POLITICAL IDEAS. *By* Professor F. J. C. Hearnshaw. (161).  
 HISTORY OF RUSSIA. *By* Prince D. S. Mirsky. (12).  
 HISTORY OF CHINA. *By* Professor W. R. Soothill. (15).  
 THE PAPACY. *By* A. L. Maycock, M.A. (16).  
 ENGLISH LITERATURE. *By* Professor C. H. Herford, Litt.D. (51).  
 FRENCH LITERATURE. *By* Maurice Baring. (52).  
 MYTHS OF GREECE AND ROME. *By* Jane Harrison. (59).  
 THE STARS. *By* Professor George Forbes, M.A., F.R.S. (107).  
 MAN IN THE MAKING. *By* R. R. Marett, M.A., D.Sc. (114).  
 SIR ISAAC NEWTON. *By* V. E. Pullin, D.Sc. (140).  
 RELIGIONS OF THE WORLD. *By* The Rev. C. C. Martindale, S.S. (151).  
 TRADE. *By* Sir Ernest J. P. Benn. (177).  
 NELSON. *By* Major-General Sir George Aston, K.C.B. (251).

### To be Published this Month

- |  |  |
|--|--|
| WORLD OF GREECE AND ROME. <i>By</i> Edwyn Bevan, M.A. (2).     | THE ENGLISH NOVEL. <i>By</i> J. B. Priestley. (87).        |
| A HISTORY OF INDIA. <i>By</i> Edward Thompson, M.A. (18).      | RACES OF MANKIND. <i>By</i> Professor H. J. Fleure. (113). |
| ISLAM. <i>By</i> Sir E. Denison Ross. (19).                    | THE BODY. <i>By</i> Dr. R. C. Macfie. (141).               |
| THE LIFE OF CHRIST. <i>By</i> Rev. R. J. Campbell, D.D. (165). | MONEY. <i>By</i> Hartley Withers. (179).                   |
| PROTESTANTISM. <i>By</i> Dean Inge. (56).                      | OLIVER CROMWELL. <i>By</i> Hilaire Belloc. (252).          |
| CATHOLICISM. <i>By</i> J. J. D'Arcy, S.J.                      | RUSSIAN LITERATURE. <i>By</i> Prof. J. Lavrin.             |
|  | THE WEATHER. <i>By</i> C. E. P. Brooks.                    |

Published by

**Ernest Benn Ltd., Bouverie House, Fleet Street, E.C.4**

and obtainable from all Booksellers.





# DISCOVERY

A Monthly Popular Journal of Knowledge

Vol. VIII, No. 95. NOVEMBER, 1927.

PRICE 1s. NET

Trustees: SIR J. J. THOMSON, O.M., F.R.S., SIR F. G. KENYON, K.C.B., F.B.A., PROFESSOR A. C. SEWARD, Sc.D., F.R.S., PROFESSOR R. S. CONWAY, Litt.D., F.B.A.  
Edited by JOHN A. BENN.

Publishers: BENN BROTHERS, LTD. All communications respecting editorial matters to be addressed to the Editor; all questions of advertisements and subscriptions to the Manager.

Offices: Bouverie House, Fleet Street, London, E.C.4.

Telephone: City 0244 (10 lines).

Telegrams: Benbrolish Fleet.

Annual Subscription, 12s. 6d. post free anywhere in the world. Single numbers, 1s. net; postage 2d.

Binding cases for Vol. VII, 1926, can still be obtained. Price 2s. 6d. net each. postage 6d.

## Editorial Notes.

THE account of his experiences in Central America that Professor Nordenskiöld contributes to this issue, reaching us within the past few days from Sweden, reveals fascinating details of a tribe that is not losing ground like so many primitive peoples but, on the contrary, appears to be extending its territory. While the Chocó Indians do not readily employ force, preferring to settle in the most inaccessible parts of the country where they may be left alone as much as possible, these extraordinary people are expert in the art of poisoning, and contrive the removal of a troublesome stranger by placing poisoned thorns in his path or by resorting to the use of snakes. The professor explored three rivers in Panama and Colombia, travelling in a sturdy motor-boat which enabled operations to be made along the coast and far up unknown rivers. Though not mentioned in the present article, the success of the expedition he ascribes as being due in great measure to his wife, who got on good terms with the women and children; while a gramophone proved a source of great interest to the natives. All members of the expedition suffered severely from fever and tropical diseases, and the leader himself almost lost his life through a bad case of blood poisoning.

In addition to investigating the Chocó tribe, Professor Nordenskiöld made a special study of the Cuna Indians on the Atlantic side of the Panama, for which he next set out. He alludes at the

conclusion of his article to this further trip, of which we hope to publish details later. Culturally the Cuna Indians are an advanced people of considerable intelligence, with a high standard of social conditions, possessing unbroken traditions from pre-Colombian times. This tribe is only superficially influenced by modern civilization, and has kept its customs and lore intact. The present chieftain has written the history of the tribe ever since the creation of the world, as it is described in the myths, and we understand that Professor Nordenskiöld has obtained a copy of this unique document.

Various patent fuels are nowadays so widely used that we gladly record a case of unexpected poisoning from this source, which is brought to our notice by Mr. C. Ainsworth Mitchell, secretary to the Society of Public Analysts. A portion of a solidified fuel tablet, used as a substitute for methylated spirit, was swallowed by a boy of sixteen, who experienced serious convulsions and even unconsciousness. After treatment with large doses of alkali he eventually recovered, but there was some loss of memory for several days. An examination of this fuel, undertaken in conjunction with Sir William Willcox, showed that it agreed in its characteristics and reactions with metacetaldehyde. A trace of the related paraformaldehyde compound had at first been suspected, but in view of the fact that relatively large doses of this can be taken and that cases are on record of recovery after a dose of one ounce or more, it is remarkable that the metacetaldehyde compound should be so much more active. It is possible, however, that traces of the condensing agents used in the preparation of metacetaldehyde may be left in the final product and have some influence on its physiological action, since no particular care would be taken to make an absolutely pure material. The list of substances claimed in the patents for the preparation of metaldehyde fuel is a very long one, and includes sulphuric acid, hydrochloric acid, zinc chloride, phosgene, etc., so that the range of possible impurities is very wide. Solid fuels are frequently

left within the reach of children, and we agree with our correspondent that it is hardly possible to give too wide publicity to their dangerous character.

\* \* \* \* \*

Though it employs no new principle, an interesting electrical device invented by the Westinghouse Co. was demonstrated last month in New York. This makes machinery almost human in the way it receives and answers questions and obeys spoken directions. According to the New York correspondent of *The Times*, the device was employed to open a door, and at other spoken orders it lit a series of lights, worked an automatic sweeper, and turned on a searchlight. The method, of course, depends on response to the sound-waves within the register of the human voice, different vibrations being set up by combinations of spoken sounds, which in turn set various mechanisms in operation. Three of the devices are reported to be already in use in the war department at Washington, taking the place of human tenders of the reservoirs which supply the city with water. When questioned over the telephone circuit they answer by appropriate sound-waves how high the water is in any certain reservoir, and they are said to obey faithfully the vocal directions to raise or lower the level.

\* \* \* \* \*

The natural water-power with which Sweden is endowed has long made her one of the largest users of electricity among European countries, and an important extension is now likely to follow. As described on another page, it has been discovered there that the soil may be effectively heated by electricity, for which purpose frameworks of clay pipe are employed to carry cables through the beds under special cultivation. Experiments in this direction have been made before, but Dr. Lind appears to have developed the first successful process; we believe also that our article makes the details available for the first time to English readers. The discovery should in particular interest importers of vegetable produce, for it is expected that in the near future supplies will be available from the Swedish market that in point of time may rival those from the warmer southern countries. Whether the new process would repay application elsewhere must largely depend on the price of electricity, a matter in which the figures we publish indicate Sweden's initial advantage.

\* \* \* \* \*

Our wireless correspondent last month described a new use of the landline which is employed on the Indian section of the new beam service, and an interesting tribute to its value has since been received

from India. It will be recalled that to control the stations, signals of wireless frequency are generated and sent along the landline; by adopting frequencies sufficiently wide apart, it is possible to work a number of control services on a single landline, in addition to which one or more telephone conversations may be conducted by means of the same landline, without mutual interference.

\* \* \* \* \*

A few weeks ago, however, according to the *Times of India*, a very bad breakdown of the trunk telephone service occurred between Bombay and Poona, and this was not put right till the following morning. While the wires could not meanwhile be of any service for telephone communication, the beam wireless—which uses the same landlines for transmitting messages up to the station at Kirkee—experienced no difficulty in passing hundreds of words through the same incapacitated wires. How this was done seems a wonder, but while the sound-waves uttered into the telephone mouthpiece could not pass beyond the spot where the break had occurred, the telegraphic waves of the beam wireless operator jumped over the breach. Thus while a breakdown incapacitated the telephone service, the new beam arrangements remained unaffected.

\* \* \* \* \*

A problem of many-sided interest in the history of Fleet Street was raised last month by a correspondent in the *Observer*, who dealt with the site of Sweeny Todd's shop. This well-known "barber" is reputed to have carried on his sinister operations about a hundred years ago, his practice being to tip his customers from their chairs into a pit below; they were then converted into meat and sold in a pie-shop next door. Whether the story, first produced as a play in 1842, was founded on fact or not, it has always been associated with Fleet Street, and the new letter is interesting as it refers in particular to the site of the *Discovery* offices. "While reading through the programme at the Elephant Theatre, London," stated the correspondent, "I was surprised to see the announcement that Sweeny Todd ran his barber's shop in Fleet Street, just between St. Dunstan's Church and the present publishing firm of Sir W. Lang & Co. Is it not an established fact that this famous barber's shop was considerably nearer Ludgate Circus? My reason, amongst others, for believing this is the discovery, not long ago, during excavations on the site of 154 Fleet Street, where Bouverie House now stands, of a large pit resembling in its proportions that into which Sweeny Todd is said to have thrown his victims."

## The Chocó Indians of Colombia and Panama.

By Erland Nordenskiöld.

*Honorary Fellow of the Royal Anthropological Institute.*

*Having just returned home to Sweden from an expedition in Central America, Professor Nordenskiöld here contributes the first account of his experiences to be published in England. As an explorer Professor Nordenskiöld follows in the footsteps of his father, the famous discoverer of the North-east Passage.*

At the beginning of January of this year I had arranged for Dr. S. Linné, with my wife and son, to join me at Panama, whither I myself was to come from San Francisco, whilst they were proceeding directly from Sweden.

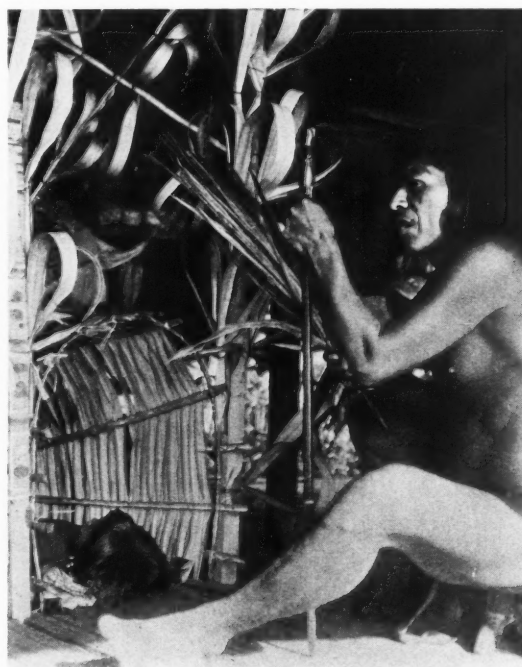
Having arrived somewhat ahead of my companions, I spent some of the intervening time strolling about in the picturesque fishing harbour of the town, where I tried to draw out old negroes and others on what they knew of ancient graves and Indians. Among other things I thus learnt that on the Pearl Islands there were mounds of mussel shell mixed with pots, which meant ancient dwelling sites. This piece of information led to our first excursion being directed to those islands.

On 12th January my companions arrived, bringing with them our equipment. This included a thirty-six foot motor-boat of the Koster type, which was to be the home of the expedition during several months. A few days later we started from Balboa, and on the 16th we were already at work on the island of Saboga, having there immediately come upon an ancient dwelling site where we were able to search for relics of the Pearl Islands' old Indian inhabitants, who in an exceedingly short space of time were exterminated by the Spaniards.

From the Pearl Islands we went to Rio Sambú, where so-called Chocó Indians are living. There the outstanding event was making the acquaintance of the great medicine-man Selimo. Thence for four months he accompanied our expedition as interpreter, legend-teller, and our introducer to his fellow tribesmen. He proved of exceedingly great use to us. Selimo had travelled extensively in Colombia for the purpose of studying under the most famous medicine-men, and was thoroughly conversant with the art of exorcising evil spirits, *i.e.*, in curing such illnesses as are caused by them.

He classified illnesses into such as derive their origin from evil spirits, which are treated by Indian methods, and such as are sent by Jesus, and are curable by medicines known to the whites. On our arrival at Selimo's place we found him with several patients. There was one man with sores on his legs,

and he appeared to be making good progress. On his chest, back, and arms were painted two-headed spirits, "animara," and he was treated partly with incantations, partly with vapour-baths. He was covered over with a cloth, underneath which he sat together with a pot of boiling water. The man with the ulcerated legs was also treated in another way, namely, by Selimo placing a leaf on the sores and subsequently sucking out the pus. In the same way Selimo treated a small girl who was suffering from boils. A third patient of his had suddenly begun to feel queer as he was out in the forest. He fancied he had heard sounds behind him as if made by people. He was not given any medicine, Selimo trying to cure him merely by singing. We had the luck of witnessing how this was done. Everybody at Selimo's place



MEDICINE-MAN CURING SMALL GIRL.

The patient is seen lying face downwards in a "medicine-but" built of grasses and leaves specially for the ceremony. The medicine-man is using a carved staff that plays an important part in the cure.

took part in the preparations, the young people collecting leaves and flowers for the decoration of the hut and of the participants, whilst the women ground maize and made maize beer and maize porridge.

A medicine-hut was then built by the men in the centre of the floor of the house. Whilst working on this, they were wearing a sort of crown on their heads. When the medicine-hut was ready, the maize beer, etc., was brought along in calabashes and earthenware vessels, and Selimo read a lengthy incantation. The women arranged the bowls and vessels on either side of the hut, and covered them over with leaves. Before doing this, they had swept the floor and sprinkled it with water in which they had steeped strongly aromatic herbs. Whilst so occupied, the women in their turn were wearing the crowns. The job being done, the crowns were placed on the leaves covering the maize beer. And on top of the leaves covering the maize beer and the food were laid Selimo's finely carved staves, some of which were spear-shaped, while others were ornamented with human figures. These staves contain tutelary spirits, and cannot be bought as long as the spirits remain in the staves because these spirits are warding off the demons of disease. Selimo had acquired these staves whilst



YOUTH WEARING MEDICINE FEAST CROWN.

Such curious headgear are worn during the building of the medicine hut, which is erected with appropriate preparations before the curing ceremony.



CHOCÓ INDIANS IN GALA DRESS.

studying under other medicine-men. Painted wooden figures containing protective spirits are also generally hung in great numbers about the medicine-hut.

After these preparations the little girl patient crawled into the hut, followed by the man whom Selimo was treating for ulcerated legs and feet. All through the night Selimo danced and sang, and not until daybreak were the vessels uncovered and their contents partaken of. We, too, were invited.

Selimo was used to handling venomous snakes. Once, as we were walking together, a small poisonous snake was seen wriggling on the ground. Quick as lightning Selimo stopped down and grasped the snake just back of the head, securely holding it between thumb and forefinger. After having spoken a few kindly words to the snake, he then carefully put it down by the side of the path. I asked him why he did not kill the snake, to which he explained that if he had done so he would have lost his power as a medicine-man.

Selimo was always superciliously and often insultingly treated by our more or less black servants. In a mild way he seemed to put up with this, but at last he thought it was time to assert himself. So one day when he and a few others were having a bathe,



and Flores, our steersman, had placed his clothes in a basket, the latter found, when going to take them out after the bathe, that there was a yellow and black, nasty-looking small snake of a venomous kind. Flores was terror-struck, but Selimo coolly put his hand into the basket, caught the snake behind the head, and held it up. He knew what he was doing, for he had himself put in there, and its poison fangs had been removed. This was by way of a hint.

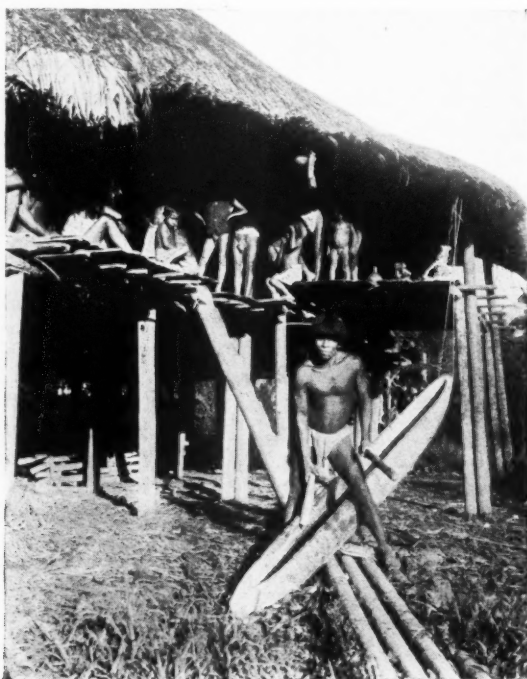
Accompanied by Selimo we visited upper Rio Sambú, and then Rio Jaqué, Rio Baudó and Rio Docamparó, the latter two rivers being in Colombia, the first-mentioned in Panama. We usually split up our work so that my wife and I visited the Indians in the interior of the country, whilst Linné did archaeological research on the coast.

Selimo hailed from Rio Docamparó, and was keen on again seeing his relatives. It turned out that he had a wife and children there too, that is to say, he possessed two families, one in Panama and one in Colombia. The most interesting part of our journey was going down Rio Baudó. At Rio Huruvidá we met some women who had come down there to see the ocean, which they had never beheld before. They



ANOTHER METHOD OF NATIVE MEDICINE.

The medicine-man blows on his patient, who, judging from her expression in this case, appears to have staged the ceremony for the photographer.



INDIAN SOUNDING A SIGNAL DRUM.

In the background is seen a native hut, built on poles. The author describes a stay in these dwellings during the expedition.

were members of the Dosirama tribe, like almost all Indians living on the upper reaches of the Baudó. They were all unmarried. The fact is that it is very difficult for the young people of Rio Baudó to get married, as it is forbidden to espouse anyone bearing the same name. The reason for this was, according to Selimo's explanation, that when God created the first people he gave them names, and these names subsequently handed down from father to son. Thus marriage between people of the same name is now not lawful. God also endowed Spaniards (with whom are also counted the negroes) and Indians with different languages so as to prevent their inter-marrying. In these days when, however, they have become mixed with each other, God is considering the expediency of annihilating the world in order subsequently to recreate it. Once upon a time a man and a woman of the same name married, and God therefore changed them into a stone. This stone is to be seen in Rio San Juan.

After our Baudó trip we ascended Rio Docamparó and thence across country to Rio Docordó. Here was the home of Selimo's childhood, beside being that of his No. 2 family. During this stage of our journey we only had to spend two nights under the stars. On all other occasions we had struck Indian huts, usually occupied, but now and again built by the Indians as rest-huts for travellers. What fine dwellings the Indians of these districts possess! They



PREPARING AN ANIMAL TRAP.

The native is setting the bait, which works a balance arrangement that rests on a pronged fork. A light tree trunk is also seen to form part of the trap.

are circular structures built with poles, and with a diameter up to eighteen metres. In almost every case these huts are very cleanly kept, and one never needs to have any fear of bugs or suchlike. I have never slept in any occupied negro huts, which are filthy and swarming with all kinds of vermin.

Unfortunately the welcome extended to Selimo included much excessive drinking accompanied by dancing and clamouring. When we had started on our return journey, the Indians resorted to all sorts of tricks in order to arrest our progress. The Chocó Indian never applies forcible means, but he is an adept at knowing how to get a canoe stuck in a river, or capsized in rapids, or how to time its arrival in an estuary at the exact moment when the tide does not serve. This extraordinary tribe, which occupies the country between Ecuador and the Atlantic, is not losing any ground but, on the contrary, extending the area of its occupation. The Chocó Indian prefers to settle in the most inaccessible parts of the country, where he may be left alone as much as possible. But, as I have mentioned, he never uses open violence. On the other hand, it may happen that a nigger whose acts of provocation have become excessive, treads on some poisoned thorn, or he may be bitten by a snake.

The Chocó Indian knows at least two kinds of poison. One of these is prepared from the secretion of a frog, and the other from the sap of a large tree. Especially the latter is considered very effective, and is used for blowgun darts. The negroes, being very superstitious, stand in great awe of the Indians' skill in magic. Among other things they maintain that in their cultivations the Indians keep tame venomous snakes that bite strangers, but not the Indians themselves. At Rio Sambú a negro had cleared and cultivated the ground over an Indian burial place. Shortly afterwards he got stung by something and died. Selimo took much trouble in helping me to find the poison tree, which is very rare, and in teaching me how to prepare the poison.

By travelling exclusively along the main rivers it is impossible to obtain any idea as to the number of Chocó. They are to be sought in the regions above the rapids, where the rivers are not navigable to anything larger than canoes. On the main rivers are the habitations of negroes and mulattoes who in a large measure exist as parasites on the Indians, acting, as they do, as intermediates in what little trading the Indians carry on with the outer world.

Strangely enough, among the Chocó no other authority exists than that exercised by the heads of the families. The idea of chieftainship is utterly unknown to them. The bond that is keeping these Indians together is similitude in culture and language or, rather, languages, as strictly speaking there are two Chocó tribes, the Emperá and the Nonamá, with different languages.

From our visit to the Chocó we returned to Panama, and then passed through the canal to carry out further researches on the Atlantic side of the Isthmus of Panama.

### Air War on Insects.

Another application of the air method of destroying insects is under investigation by the U.S. Department of Agriculture, which has authorised the expenditure of £10,000 on an attempt to control the sugar-cane moth borer. Approximately 5,000 acres of the sugar producing area of Louisiana are being "dusted" with sodium fluosilicate. At the present time the insect is found throughout the territory and its damage to the cane runs from 15 to 30 per cent. of the total crop annually. The most effective way to control this pest is to submerge seed cane in water for seventy-two hours before planting, which is certain death to the borer. It is hoped, however, that the experiment in aeroplane dusting may prove to be equally effective and more economical.

## North Elmham : A Saxon Cathedral.

By A. W. Clapham, F.S.A.

*A recent new survey has brought to light various features in an ancient ruined building at North Elmham, which confirm its identification with the cathedral of the Norfolk see in Saxon times. The remains of some towers found disposed in a unique fashion show the great change in our artistic traditions that was brought about by the Norman Conquest.*

TIME, and in this instance, tide as well, have dealt unusually hardly with the major churches of the Anglo-Saxon age. In continental countries, here and there, a great church of the Dark Ages has survived, in whole or in part, to remind us that however barbaric those times might be in manners and culture, they could yet raise buildings, *more Romanorum*, which were not altogether unworthy of their distinguished parentage.

That such was also the case in England can be proved by anyone who cares to visit the church of Brixworth in Northamptonshire, which reflects so closely the massive stability of Roman work, that it is difficult to realize that it was built in the seventh century as a mere offshoot of the Abbey of Peterborough. If such, then, was the form and fashion of a comparatively unimportant Saxon minster, it is easy to visualize what has been lost by the almost entire destruction of the Saxon cathedral and abbey churches of the same age. England suffered more severely and more lengthily from the Scandinavian raids than the continental countries and, after the Norman conquest, underwent in addition a sudden and revolutionary change in architectural ideas, the two causes combining with the inroads of the sea at Selsea and Dunwich to make almost a clean sweep of the greater churches of the Saxon period.

The surviving remains of the Saxon cathedrals have thus been reduced to a few fragments at Sherborne and Hexham and the ruins of the remarkable structure at North Elmham, in Norfolk, which is the subject of the present article.

### The Ancient See.

The ancient see of East Anglia was established about the years 630-6 at Dunwich, on the Suffolk coast, by a Burgundian priest or bishop, St. Felix, who was sent by Archbishop Honorius "to preach the word to the nation of the Angles" and became the first bishop. In consequence of the reconstruction of the English church by Archbishop Theodore, later in the same century, the East Anglian see was divided, the bishop's stool of Suffolk remaining at Dunwich and that of Norfolk being set up at Elmham. That

this Elmham was North Elmham in Norfolk and not South Elmham in Suffolk, only thirteen miles from Dunwich, would appear obvious from the probabilities of the case, but has nevertheless been long disputed on entirely unsubstantial grounds. The question has, however, been set at rest, let us hope finally, by the discovery of a note in a report prepared for Anthony Bek, Bishop of Norwich (1337-43) which distinctly states that North Elmham was in ancient times the bishop's see.

The later history of the see in Saxon times need not detain us, for though in the tenth and eleventh centuries there was again but one bishop in East Anglia, he was bishop of the two sees which were not finally united until after the Norman conquest, when the joint cathedral was moved first to Thetford and thence to Norwich.

### A Ruined Manor-house.

North Elmham is a typical Norfolk village, seventeen miles north-west of Norwich, with a typical Norfolk church, and near it the remains of a rectangular earthwork or fortified enclosure, having the ruins of a manor-house in the south-west angle. This manor-house was built by Bishop Henry Dispenser of Norwich at the close of the fourteenth century, and the earthwork which surrounds it was the work of an earlier bishop of the same see, for the property has belonged to the East Anglian bishops from before the Conquest down to our own days. In 1891 the ruins of the manor-house were excavated by the then vicar of the parish, but it was not until 1903 that Mr. Butterick called public attention to the fact that the most substantial parts of the remains were those of a church which had been altered and adapted as a manor-house by Bishop Dispenser. At this point the matter remained, until within recent months a new survey of the ruins was made by Mr. W. H. Godfrey and myself, for though various writers had commented on the building in the interval, and its pre-Conquest date was commonly allowed, its most striking features, largely owing to the inadequacy of the earlier plans, had passed quite unrecognized. There can now be no doubt that this building is the pre-Conquest

cathedral of the Norfolk see, for it occupies the right topographical position, its age is certainly pre-Conquest and the plan is such as would be quite out of place in a parish church.

The construction of the building, equally with its plan, is so unusual, that the most superficial observer must realize that he is in the presence of something unfamiliar, not to say *outrée*. The walls, which stand to a height of eight or ten feet, but contain no windows, are built almost entirely of masses of conglomerate or pudding-stone, stained to a dark brown colour by iron. This unpromising material is used, not only for the substance of the walls, but for most of the angles of the building, for a series of cylindrical shafts which decorate the exterior, and even for the steps of the staircase in the western tower. The portion of the church which has suffered most demolition is the transept and east end, which did not enter into the scheme of the

fourteenth-century manor-house and were consequently pulled down, generally to the foundations; the main apse, indeed, was almost entirely destroyed by the digging of the manor-house moat. The complete plan can, however, be recovered, and reveals a cruciform church of T-shape, with a shallow apse east of the transept, an aisleless nave flanked by a pair of small towers in the angles of the transept and having a large square tower at the west end. The transept was evidently roofed from north to south, as there are no remains of cross-arches; arches opened from it, east and west, into the apse and nave, and a wide third arch opened from the nave into the west tower; the bases of this arch remain on either side. Projecting from the south face of the west tower is a large rounded stair-turret. The total internal length of the building was about 123 feet.

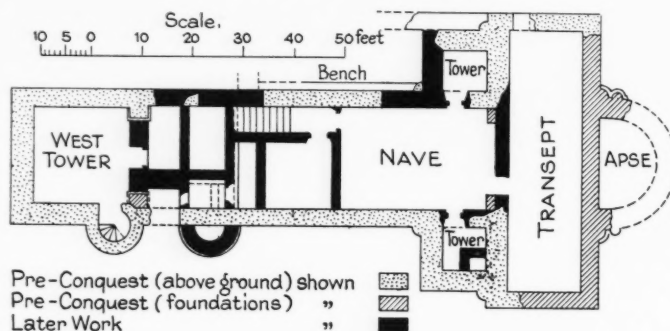
The most remarkable architectural feature of the church is the series of semi-cylindrical buttresses which form a rude decoration to the re-entrant angles and to the main apse. These curious shafts are almost unknown elsewhere in this country and if they were continued, as seems probable, all round the outside of

the apse, the resultant effect of continuous corrugation must have been both striking and unfamiliar. I have said that buttresses of this type are extremely rare in England, they are, however, to be found occasionally in France, where they seem to form a distinctive, but by no means common, feature of the churches of a certain period. Anyone who has seen both examples will be struck by the similarity in form and feeling between the Elmham cylinders and the cloister buttresses at Tournus on the Saone. In both cases the undressed stone is used and the unresponsive material is cut roughly to a curved face, no doubt originally covered with a heavy layer of

plaster. The cloister at Tournus can be fairly closely dated to the first or second quarter of the eleventh century, and other examples in France seem to range themselves round about the central date 1100. All have the same general character, a semi-barbaric aversion from the use of dressed

stone or ashlar and a clumsiness of thought and execution, according well with the age when the Carolingian Renaissance had been almost extinguished by the Scandinavian scourge and the later Romanesque was struggling to birth.

Another feature of the Elmham church has a direct bearing on the age of the building, and affords evidence of the type to which it belonged. The existence of the large west tower has long been recognized, but the evidence for the two smaller flanking towers has only recently come to light. The outer walls of these two structures are considerably thicker than the adjoining main walls of the transept and nave; this can only signify that they were intended to be carried up to a greater height than the main structure, in other words, that they were towers. We have thus a building with three towers, disposed in a fashion, which, so far as we know, was not exemplified in any other English building. The normal type of larger Saxon church of the tenth century was provided with two towers, set axially, one tower rising over the crossing and one standing at the west end. We know that such was the case at Ramsey, Ely, Durham and



RECONSTRUCTED PLAN OF THE SAXON CATHEDRAL OF NORTH ELMHAM.

Owing to the inadequacy of earlier surveys, the most striking features in the ruins had been overlooked until the author recently discovered their significance. (Based on plan in the *Antiquaries Journal*).



elsewhere, and the arrangement was a direct copy from some of the greater Carolingian churches on the continent, of which St. Riquier (Picardy) was the best known and most nearly neighbouring example. The Carolingian architects, however, by no means confined themselves to this type, and used considerable freedom in the number and grouping of their towers, which in many cases were only glorified staircases. A quite usual position for towers, on the continent, was flanking the eastern arm or presbytery of the church, generally in the angles formed by the transept. Examples of this arrangement became more frequent as time went on, and culminated late in the twelfth century in the cathedral at Laon, with a tower in each angle of the transept, making, with two at the west end, six in all. Nearly all the earlier continental examples differ from Elmham in having the two flanking towers placed east of the transept; this, however, has little significance, as at Elmham this position is ruled out by the absence of a presbytery.

I am inclined to think that these Elmham towers were built to contain wooden staircases which led to the roofs and possibly to chambers or galleries over the transept or nave. They have no signs of open arches towards the nave, and were evidently always approached by narrow doorways, though the existing doors are a reconstruction of the fourteenth-century bishop.

A word must be said about the curious T-shaped transept and its shallow apse. This form of church is common in the earliest age of church building after the conversion of Constantine, but becomes extremely rare after the eighth century. The structure at Elmham appears to be homogenous throughout, but it is possible that in the east end we have a shadow of the earlier cathedral of



(Photos by Clarke, Bungay.)

#### THE TRANSEPT AND NAVE AT NORTH ELMHAM.

Such curious T-shaped structures were common in the earliest age of church building, but a transept of this form becomes very rare after the eighth century.

the age of Theodore retained in the structure of the later church.

The earthworks of the bishop's castle or manor-place at Elmham form a valuable piece of evidence, in one direction, of the date of the structure within them. These earthworks consist of a deep ditch surrounding a roughly square area with the remains of a keep-mound or motte at the north-west angle. Whatever conditions may have determined the square form of the enclosure, there can be little or no doubt as to the date of the motte and ditch, which must be assigned at latest to the twelfth century, after which period castle mounds became obsolete in military engineering. We may thus assume that the earthworks are due to one of the earlier bishops of Norwich, after the Norman conquest. The significant feature of the matter consists, however, in the fact that the digging of the ditch and the piling of the displaced earth on the inside of it buried the remains of the church to a depth of nine feet or more above its floor level. It was largely this earth which had to be removed when the building was excavated in 1891, and the Norman earthwork still covers much of the external face of the western tower. It is quite obvious that a building buried by a Norman earthwork must have been abandoned before that earthwork was constructed, and consequently the church must be pre-Norman. This conclusion is indeed forced upon one by the nature of the structure itself. It stands, and has always stood, within the enclosure of the East Anglian bishops, and one or other of these bishops must have been responsible for its erection. That Herfast, Losinga or their immediate successors could have built in the Elmham manner is inconceivable, and one is obliged to assign the work to one of their Saxon predecessors. We have



SOUTH SIDE OF THE NAVE, SHOWING TURRETS.

The furthestmost of the two turrets is that enclosing the original Saxon staircase; the other was added by Bishop Dispenser.

seen that the architectural peculiarities, borrowed from Carolingian and later models, seem to indicate a date near the beginning of the eleventh century, and this would accord well with historical probability, the only alternative date, eliminating the two main periods of Danish aggression, being a part of the tenth century; this, however, does not agree so well with the architectural evidence.

It is not difficult, with the aid of a little imagination, to reconstruct the appearance of the cathedral of Elmham as it was built. Across the east end ran the long high-pitched roof of the transept, and against its eastern face the curved and corrugated face of the apse, terminating in a conical roof against the transept

wall. At the back of the transept rose the two staircase-towers, and still further in the background the great square bell-tower at the west end. The whole building was no doubt plastered and white-washed and finished with the elaborate terminals and weather-cocks so familiar from the Anglo-Saxon manuscripts. Such a building must have presented an appearance and outline radically differing from anything with which we are now familiar in this country, and may serve to illustrate how great a break in our artistic traditions was brought about by the Norman Conquest. In any case, it is at North Elmham and at North Elmham alone that we can still gain some definite idea of what a Saxon cathedral was like.

## A Zoologists' Meeting in Hungary.

By Colin Matheson, M.A., B.Sc.

*Keeper of the Department of Zoology, National Museum of Wales*

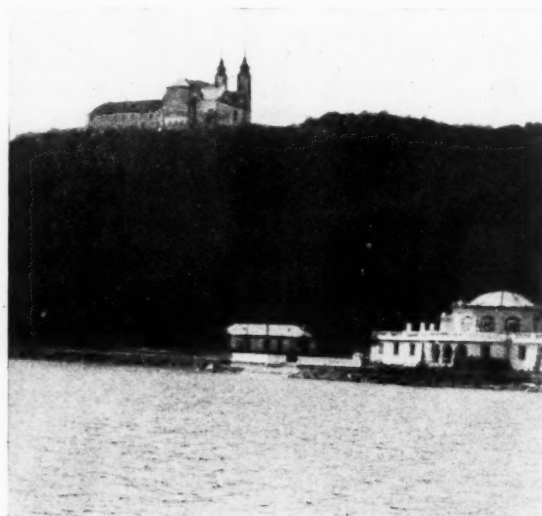
*As a visitor to the recent international congress in Budapest, the author was present at the opening of an important new research station on Lake Balaton. Another interesting excursion is also described.*

AT Budapest, in September, there was held a long-deferred congress of great importance to zoologists the world over—the Tenth International Congress of Zoology, presided over by Dr. G. Horváth, formerly Director of the Hungarian National Museum. The original plan of holding such a congress every three years was adhered to until the Ninth Congress at Monaco in 1913. On that occasion an invitation to Budapest as the meeting place for 1916 was accepted, but owing to the war this project had, of course, to be postponed, and for various reasons the Tenth Congress was held at last no less than eleven years after the date assigned for it. It was from various parts of a much-altered world that the delegates came to a much-altered Budapest—to a Budapest which, however, is still, despite the ravages of external and internal troubles, a noble and a beautiful city.

Between seven and eight hundred members and associates attended the Congress. In addition to the general sessions held in the mornings, where the papers dealt with matters of interest to all zoologists, there were nine sections dealing respectively with general zoology, anatomy and physiology, experimental zoology, vertebrates, arthropods, other invertebrates, applied zoology, palaeozoology and zoogeography, and nomenclature. It is not the purpose of this short article to deal with individual papers, but we may note, as illustrating the international nature of the Congress, that the programme included papers by members from Egypt, India, Japan,

Mexico, the United States, and, of course, from almost all the European countries.

Visits were paid during the Congress to most of the important educational institutions of Budapest; these are situated mostly on the more modern Pest side, though in Buda there is, for example, the fine new Technical University, built during the years 1905-10. Modern Budapest, in addition to its



BENEDICTINE ABBEY ON LAKE BALATON.

This thousand-year-old institution overlooks the new research station seen in the photograph on the opposite page. The abbey is here viewed from the steamer.

university buildings, academies of art and music, and many fine schools, possesses about twenty museums and art galleries. Among the most important are the National Museum, the Museum of Industrial Art, the Agricultural Museum, and the Municipal Museum. The Agricultural Museum, set amid beautiful surroundings in the City Park, is one of the richest and most interesting institutions of its kind in Europe.

In addition to the lectures there were two important excursions—one to Lake Balaton, when the new building of the Tihany Hydrobiological Station was formally opened, and another to the vast plain known as the Puszta Hortobágy, a grazing ground for large herds of horses, cattle and sheep.

The Tihany station is equipped in a manner to arouse the envy of many a worker in this country. Eventually there will be four buildings—one containing the research laboratories, a house with accommodation for visiting investigators, another house for the staff, and finally a public aquarium, but at present only the first two are completed. The institution is divided into two departments; the first, dealing with zoology, botany, and hydrobiology, occupies the ground and first floors of the research building. Here are the offices of the staff, beautifully-equipped laboratories, a library, a room for fish-breeding, store-rooms, a machine-house, and other rooms. On the second floor are the offices and laboratories of the department of physiology and chemistry.

One side of the building is in the form of a tower, containing a drawing and photographic room, a dark room, and reservoirs for the supplies of Balaton lake-water and artificial sea-water. On the roof is a terrace on which meteorological instruments may be used. The lodging-house for guests is well-furnished and contains twenty-six beds, and the monthly cost for lodgings, a fully-equipped working place in the laboratory, and research material, works out at rather less than five pounds in English money.

Situated on the shores of Lake Balaton, beneath a beautiful hill from which a thousand-year-old abbey of the Benedictines looks down on this new home of

science, the Tihany biological institute is a place never to be forgotten.

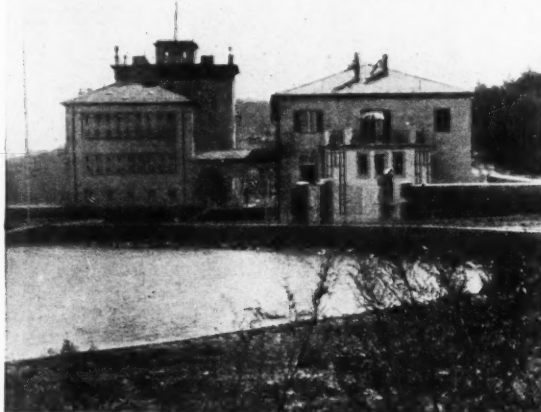
Northwards again to Budapest, along the pleasant shores of the lake, through the wide Hungarian plains with their waving crops of maize. Thence, after a night's rest, a hundred and twenty miles east to the royal free city of Debrecen, "the city of schools," one of the great seats of learning in Hungary. Here is a long-established university, a splendid new medical college, a conservatory of music, an agricultural academy, a commercial college, and many other important educational institutions. Our stay in Debrecen, however, was short and permitted an examination of only a few of these.

From Debrecen it is but a short distance to the Puszta Hortobágy, where, in the herdsman with their picturesque robes and in their roving herds, one gets a glimpse of the past, of the primeval life of the Magyar. The city of Debrecen, partly by mortgage and partly by outright purchase, came into possession of the uncultivated land previously owned by the villages which were depopulated by the Turks, and at the present day it owns about 38,000 acres

of the surrounding country, on which roam the famous herds of the royal free city. In the sixteenth century Debrecen tradesmen drove thousands of Hungarian cattle, bred on the Puszta, to the fairs at Vienna, Munich, Nürnberg, and elsewhere, but this export trade, largely owing to political reasons, later received a serious check.

In 1909 the number of animals on these plains was over fifty-two thousand—cattle, horses, sheep, and pigs. It has decreased since, but there were still herds numbering forty-one thousand in all in 1923. The cattle are beautiful animals, and said to be direct descendants of those cattle with long silver-white horns which the early Hungarians drove before them from southern Russia when migrating towards their present abode.

The herds belong, some of them to the city of Debrecen, and some to private owners. Special herds are kept for breeding purposes—the city's herd



THE HYDROBIOLOGICAL STATION AT TIHANY.

Conveniently situated on the shores of the lake, this new research station is a model of what such an organization should be. It was opened a few weeks ago.

of breeding horses is over a hundred and fifty years old, the herd of breeding cattle of later date. The grazing period begins usually about the first of April, and except in case of excessive summer drought the animals remain out until the end of November. Naturally they become somewhat wild during this period: except in the case of the city breeding herds, which are carefully tended, they have neither stables nor pens.

A word as to the herdsmen themselves. A fine stalwart set of men, they are dressed in a striking costume, varied in detail but consisting generally of a variegated gabardine, flowing fur mantle, and extremely wide and pleated linen trousers, known as *galya*. A broad-brimmed hat, often adorned with feathers, completes this picturesque attire. The gangs of herdsmen usually consist of from two hundred and fifty to three hundred people. During the grazing period the men looking after the cattle and horses use their huts only to store food and clothing—they sleep in the open, under the ample cover of their fur cloaks. More comfortably appointed are the huts of the shepherds, who have their wives and children with them.

This old-world order of things is gradually passing away, inevitably perhaps but none the less regrettably. As the train bore away the writer, musing on this subject, from his last glimpse of Hungary and the hospitable Hungarian people, his eye fell on the final paragraph of a booklet lying open beside him. It may contain a little consolation for those who foresee the world of the future as largely disenchanted—

"Culture is gradually encroaching on the ancestral vocations of the Hortobágy. But if the herds and flocks walking at will over these plains will become rarer, if the plough will some day turn up those grassy fields, and even the shepherds will change their ancient national garments for international clothing, the lark will still sing her majestic song over the waving corn, the mirage will remain true to her sweetheart, the Puszta, playing her games of witchcraft, and the sun will continue to present his wonderful freak variations, 'the Fata Morgana of the morning,' as Jokai called it, the dawn."

## The Wireless Exhibition.

THE National Radio Exhibition held in London a few weeks ago, revealed two marked tendencies in wireless trade progress. The first was of particular interest in view of the contention recently advanced in *Discovery*, that the intelligent listener wants a set that will work with the minimum of "gadgets," and that there are far more potential wireless users in this category than there are amateur constructors, who hitherto seem to have been chiefly provided for. In this respect the apparatus displayed at Olympia left last year's products far behind. Receivers which vied with one another in confusing the public by the multiplicity of knobs and dials, have given way to simple looking apparatus with three, or two controls—in some cases only one—while sets which may be operated by energy derived from the mains are more prominent than hitherto. The general impression gained was that the day of the component

trade is fast fading in favour of complete receivers, for many firms which hitherto made only components are now producing elaborate 3-, 4- and 5-valve sets, while those already manufacturing sets have so drastically altered their designs as clearly to indicate their future policy. On the other hand, that the Radio Manufacturers' Association intends to encourage home set building was indicated by an announcement suggesting that the novice would come away from Olympia wondering "why he never tried to assemble a set before."

The other main feature of the show—perhaps the most outstanding development in set design this year—is found with the use of "screened-grid" valves, by means of which the advantages of neutralizing may be obtained without encroaching upon the preserves of American patentees, and without providing the necessity for overcoming the somewhat difficult problem of parasitical oscillation. Another advance appears in the new loud speakers, many of which have been so disguised as to resemble artistic ornaments rather than the ugly swan-neck flares that have been usual in the past.



A TYPICAL HERDSMAN OF THE PUSZTA.

Huge herds of fine cattle roam these Hungarian plains, the very flat nature of the country being indicated by the horizon. Notice the animals' silver-white horns.



## A Bird Census in the French Alps.

By E. M. Nicholson.

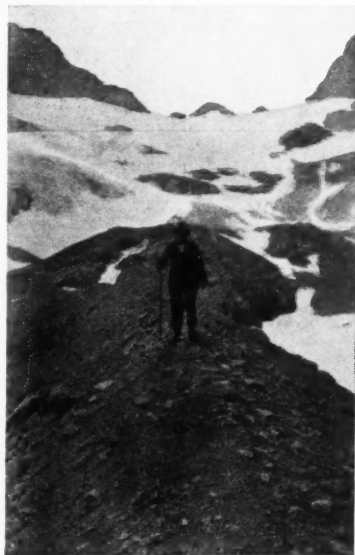
*The writer recently undertook a sectional bird census in the French Alps, during three excursions of which the first is described below. Counts taken at different heights reveal much detail missed by ordinary observation, as is further confirmed by the concluding results to be published next month.*

THE value of a bird census is underrated because its function is misunderstood. Captious critics assume that unless it achieves an exact statistical record of the bird population it is bound to be worthless, and are never tired of pointing out with immense solemnity the unlikelihood of such precision being attained. Certainly a record of this sort would be of great value, but a census with no pretensions to ideal exactitude may still possess a definite usefulness. Actually it is only a minor achievement of the national census to inform us that England contains 35,678,530 people, for apart from questions of density the fact is of slight significance. What is of much more importance is to know that France, though four times as large, contains only three-and-a-half million more, or that our own population roughly doubled between 1800 and 1850, and has doubled again between 1850 and the present day. It is proportions and changes which mean something; a population figure is no more than an abstract mathematical conception until we come to comparisons. And obviously for purposes of comparison quite a crude census method, used with common sense and adequately checked, may give sufficiently satisfactory results. It would not (to keep the human parallel) be hard to discover, simply by counting passers-by, that Aldershot contains a much larger military element than Tunbridge Wells, that the "submerged tenth" is more than a tenth in Poplar and less in Haslemere, or that Bath has a heavy surplus of women. In the same way the different composition of the bird population in different countries, or in different types of country, is readily ascertainable, although to arrive at absolute statistics would require much more careful and prolonged study.

Personally, I had been working purely on the exact enumeration of birds on definite small areas,

but after some conversations with Messrs. C. S. Elton and W. B. Alexander, I was persuaded to try out a form of the sectional bird census, with results which I will summarize here, and which have convinced me of the value of this apparently rough-and-ready method. The sectional bird census involves walking as far as possible in a straight line and counting all birds noted within approximately one hundred yards on either side. While in the French Alps lately I accompanied a friend who had an ambition to cross the Brèche de la Meije (11,017 feet), and since the bird life at high altitudes (particularly on a formidable glacier like this) promised to be sparse and easily visible, it seemed worth while to attempt a census of birds met with. On 27th July, 1927, leaving La Bérarde with a guide and a porter about 5 p.m., we pushed up the Etançons valley to the refuge called Le Chatelleret, where we slept that night. Next morning, getting away drowsily by 3 a.m., we started up in pitch darkness, and within half-an-hour were caught by a terrific thunder-

storm which forced us to take refuge first under isolated rocks and, when these failed, beneath the face of a lofty cliff on the north-west side of the valley. We had already crossed the lower extremity of the glacier. Dawn broke, but huge shapeless clouds continued to roll up the valley, and it was snowing towards the Meije; in the distance there were growls of thunder every now and again. We waited an hour, and although it seemed likely that the weather would eventually clear, no improvement occurred. The guide condemned the scheme as no longer practicable, and we began a retreat to Le Chatelleret, during which another storm caught us and soaked us through. We retired defeated to our straw and slept fitfully till 7 a.m., when, too late, the weather cleared. Both

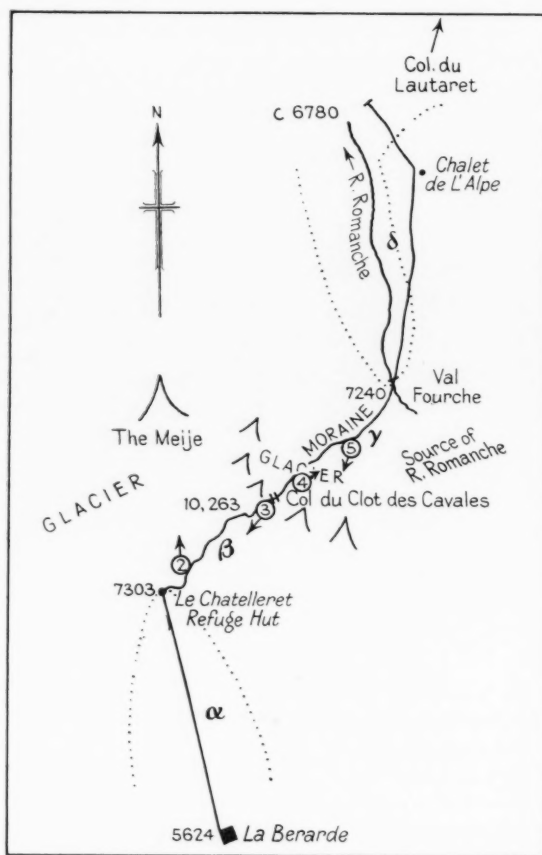


THE COL DU CLOT GLACIER.

The writer is here seen on the moraine below the Col du Clot des Cavales, the pass which formed his first goal during the bird census. The position of this view is indicated in the map overleaf. A martin and 2 black redstarts were met with about this spot—at 9,000 ft.

time and the fresh soft snow now put the Brèche out of the question; we were forced to content ourselves with the Col du Clot des Cavales, which was almost as high (10,263 feet) but a case of simple plodding, largely along zig-zag paths with neither difficulty nor interest. Only for a short stretch on either side of the saddle did we cross snow. We came down by Val Fourche and along a marvellous valley full of boulders and green turf to Chalet de l'Alpe, Arsine, and Villar d'Arène. Ruling out the abortive first start, when it was too dark to see, the census extended from La Bérarde to a point near Pas de l'Ane à Falgue; a map distance of approximately sixteen kilometres, or roughly ten miles. This was divided into four sections. The first ( $\alpha$ , map) from La Bérarde (5,624 feet) to Le Chatelleret (7,303 feet) was a barren valley with steep sides, and a shallow middling-sized stream flowing south along it. An Alpine (or water) pipit, *Anthus s. spinoletta*,\* just above the starting point and a pair of Alpine choughs (*Pyrrhocorax graculus* Linn.) at c. 7,000 feet were the only birds noted; we also heard marmots twice. Next morning at the outset of the second section ( $\beta$ , from Le Chatelleret to Col du Clot des Cavales, 10,263 feet) we found five Alpine choughs hanging about the refuge; an Alpine pipit and three young rock thrushes (*Monticola saxatilis*) were noted up the east wall of the valley at above 8,000 feet. The next bird seen was a solitary Alpine chough flying up and down above the crest at an altitude of at least 10,500 feet. This species ranges higher than any other bird, and even visits the loftiest slopes of Everest. The

character of this section was a steep stony wall with little important vegetation, all in shade, a small glacier at the top. Beyond the crest was a long *glissade* over the snow, descending to an immense moraine ( $\gamma$ ). The first birds noted in descending were a pair of black redstarts (*Phoenicurus ochrurus*) on the moraine and a house-martin (*Delichon u. urbica*) hawking above it, both at c. 9,000 feet. Although I never saw two simultaneously the behaviour of the martin left very little doubt that it was breeding at this considerable elevation. It hawked flies repeatedly over the moraine, and kept making over to some crags, where it always disappeared. The glare from the snow was so intense on this bright morning that if I took off my dark glasses to use the binoculars I was hopelessly dazzled; while keeping them on I could never follow it far enough. An Alpine pipit, another martin, and two more black redstarts were noted at the confluence (Val Fourche, c. 7,240 feet). Here, at the foot of the moraine, where small rubble gave way to great boulders with little lawns interspersed, the



ROUTE OF THE SECTIONAL BIRD CENSUS.

This map (not to scale) shows the writer's route from Berade to Val Fourche, and the heights of the observations. The positions from which the photographs opposite were taken are indicated by the numbered arrows, but the first is shown by name only. The view on the preceding page is that from (3) above.

valley broadened and the Romanche River, as cold and white as ice, came in on the right. The bird population suddenly increased. On this last section ( $\delta$ ) down to c. 6,780 feet, I noted altogether seventeen Alpine pipits, twenty-four Alpine choughs, one adult male and one young rock-thrush, eight black redstarts, eight snow-finches (*Montifringilla n. nivalis*), one Alpine accentor (*Prunella c. collaris*), and one wall-creeper (*Tichodroma muraria*). These results are more clearly expressed in the table opposite, from which it is seen that about 70 per cent. of the population was found below 7,000 feet, although more than half the area worked lay above that elevation. To calculate

\* Scientific names are given on first mention in the case of non-British species, or where reasonable possibility of confusion exists. Subspecific determinations are based solely on geographical distribution.

what that area amounted to is obviously possible only within wide margins of error, but on the rough basis that an acre 200 yards wide is 72.6 feet along, a cross-section including 100 yards on either side covers

mountain side, and naked steep valley with stream. The result thus tentatively arrived at (81 birds on c. 1,500 acres, c. 5.4 birds per 100 acres over all) strikes me, from such general observation as I was



TYPES OF COUNTRY ENCOUNTERED AT VARIOUS HEIGHTS ON THE BIRD CENSUS.

(1) Val Fourche, 7,240 ft. (2) The Meije Glacier, seen from above the refuge hut, c. 9,000 ft. (3) Mountainside, looking back towards Le Chatelleret, from 10,000 ft. (4) View from Col du Clot des Cavales at 10,250 ft.—haunt of the Alpine chough

approximately 72½ acres for every mile of its length. Actually I was able from the nature of the ground to cover a path of about double the normal width, giving with zig-zags and vertical element allowed for an area of at least 1,500 acres worked, on which I feel sure that well over 80 per cent. of the bird population present was recorded. Out of a total observed population of 81 birds 49 were concentrated on the last c. 190 acres—giving a density of nearly 26 per 100 acres for this green alp and valley section—against 2.44 per 100 acres for all the rest—glacier, moraine, snowy col,

able to make, as being true of all this mass of Dauphiné Alps except those parts which are cultivated to high altitudes and have villages perched upon them, which will next be considered. (The tables of species for the above count will be combined in the general results to be detailed in the concluding part of this article next month.)

### Royal Institution Lectures.

THE winter lectures at the Royal Institution begin on 1st November, at 5.15 p.m., with the annual course of three Tyndall lectures, at which Sir John Herbert Parsons speaks on the subject of light and sight. On 22nd November, four lectures will follow by Sir William Bragg, on a year's work in X-ray-crystal analysis. The Saturday afternoon programme includes lectures by Mr. Clifford Smith on the furniture and equipment of the mediaeval house, and by Dr. Mortimer Wheeler on London before the Norman conquest; while Dr. F. J. M. Stratton will deal with recent developments in astrophysics. The 102nd course of Christmas lectures for juveniles will be delivered by Professor E. N. da C. Andrade on "Engines," commencing on 29th December at three o'clock. The subjects will be (1) The rules which all engines must obey; (2) Learning about steam; (3) Engines which work to and fro; (4) Engines which work round and round; (5) Putting the furnace in the cylinder; (6) Heat engines which produce cold.

### ANALYSIS OF RESULTS.

There were observed :—

In the first	5 kilometres	3 birds	...	5,624 feet elevation
" next	3	" 9	"	7,303 " "
" "	4	" 8	"	10,263 " "
" "	2	" c. 12*	"	7,270 " "
" "	2	" c. 49*	"	6,950 " "
" whole	16	" 81	"	6,780 " "

Of these :—

0 birds were observed between	5,624 feet and 6,000 feet.
c. 56* " " "	6,000 " " 7,000 "
c. 21* " " "	7,000 " " 9,000 "
3 " " "	at c. 9,000 "
1 bird was	" c. 10,500 "

\* The figures are given as approximate because they were not kept separate at the time: the total is definite but its division between these two sections is not so.

## "Central Heat" for Crops: A Swedish Development.

*Experiments have in the past been made with a view to artificial heating of the soil, but what appears to be the first successful process is described in the following report reaching us from a Swedish correspondent. Important developments should follow this discovery.*

AN interesting agricultural discovery is now being developed in Sweden, where the soil itself is heated by electricity. The method appears to have been discovered by chance, it being noticed that the crops



A DEMONSTRATION OF THE NEW SYSTEM.

The clay pipes are seen laid out in frameworks, the beds being covered with a layer of soil before operation.

adjoining the path of an electric cable, which happened to be laid surface-deep through a field under cultivation, flourished more rapidly than those growing under ordinary conditions. Dr. Lind, who is working on the process at Stockholm, recently stated that the experience already gained by electric heating of the soil is quite epoch-making. Trials have not only proved successful, but at this moment beds, electrical cables, and appropriate fittings are standardized and ready for use on a large or small scale.

The unit of the system consists of a wooden frame 1.8 metres in length and 1.2 metres in breadth, a number of such frames place side by side forming a standard bed of 28 metres long. The length varies with that of the cables, which are in turn determined by the strength of the current available. Foreign cables were tried but found unsuitable, so that only Swedish cables of the well-known Siewert concern are now in use. The cables are laid in pipes of brick on a groundwork consisting of four inches of gravel and eight inches of charcoal breeze. On top is a layer of earth, five inches to a foot deep according to the

needs of the different crops to be cultivated. The charcoal breeze is used for isolating the heat, and has been found most serviceable. The pressure employed is 127 volts.

The whole construction is of permanent nature and lasts for many years with relatively little maintenance. The equipment is reckoned to cost seven shillings and sixpence (seven crowns) per square-metre. The heat of the horse manure formerly used only lasted a fortnight, but that of the electric method may be used all the year round, during the winter the soil being kept just warm enough not to freeze.

The cost of the heating amounted during March to twenty-seven shillings per standard bed of 28 metres, and the price of the current was approximately one farthing per kilowatt. Current was used at night only, which explains its cheap price.

As illustrating the cost of forcing crops by this method, it may be mentioned that 2,400 heads of salad have been produced for the total cost in current of twenty-four shillings. When each head is valued at threepence, it is clear that this business is a profitable one.

It has been endeavoured to heat free beds on a field, with an area of 2,000 square metres. The cables are bedded down without the cover of pipes at a depth of one foot and at distances of sixteen inches apart, 5,000 metres of cable being used to cover the field. With this kind of heating, three weeks' earlier growth is gained, and the fear of frost is conquered. Even the delicate dahlias have endured a night frost of 12 degrees after being well covered. Dr. Lind is certain that the development has a great future in Sweden. When carried out on a large scale the system is more advantageously constructed near some large source of water power. The use of night-current also provides an immense saving, as the current not in use for the electric stove may be profitably employed for the private garden.

"Electric gardening" is especially promising in the north of Sweden. Coupled with the strong sun there during early spring and its supplies of natural water power, this part of the country need no longer envy southern Europe its early vegetables, as even export to the south ought to be possible in the near future.



## Correspondence.

### THE ORIGIN OF LANGUAGE.

To the Editor of DISCOVERY.

SIR,

On reading the summary of Sir Richard Paget's new theory of the origin of language, in your September issue, I was at once struck with the striking confirmation shown by foreign languages of the theory detailed in the second paragraph on page 295 (dealing with tongue gestures).

Take "lit-tle": I insert the hyphen to indicate the point where the tongue is driven down behind the lower teeth; the same phenomenon can be observed in French and Hindustani: "pet-it," "chot-ta." Likewise with "big," where the mouth tends to remain open, "grand" and "burra" need the same mouth action.

Comparison of the mouth action for numerous words in many languages is likely to produce a mass of evidence for or against this novel theory, of no inconsiderable interest to your readers.

Yours faithfully,

Bombay.

W. M. NATHAN.

17th September, 1927.

To the Editor of DISCOVERY.

SIR,

I hope another word on "ta-ta" will be allowed. Mr. C. E. Shelly has made some mistakes. He has never seen *Ei Thad*—"Our Father" in a Welsh church, and "Fader" is not a Saxon word. It is a form of the Latin Pater. There is no need of the theory of the Welsh nurse to explain "ta-ta." The English tongue is a very composite language, made up of a dozen other languages and more. A philologist will say that the Anglo-Saxon contribution is small.

The Anglo-Saxon idea generally is a pleasing fiction, brought into vogue when this country thought it a fine thing to claim blood relationship with the "blond beast." Historians say that the whole population of the country at the time of the Norman Conquest was hardly one million. This was five hundred years after the Anglo-Saxons had settled in the country. By natural increase 60,000 or so would become a million in five centuries. When we consider that other people had been coming in, Norway, Sweden, the Picts and Scots, and the Danes, who had been pouring in and had conquered the best part of the country, then it is clear that the Anglo-Saxons could not be many.

History is largely written by vanity, and the most conscientious historian cannot avoid bias. I think "ta-ta" is a sound natural for a child to utter. I believe some tribes in Africa have a similar word. But some children say "ba-ba" like sheep, and hence baby, and pa, and papa.

Yours faithfully,

Llanfair D.C. Vicarage,  
Ruthin, North Wales.

D. DAVIES.

Sir Richard Paget writes:—

"I am not a philologist, and am quite content to let Messrs. Shelly and Davies fight their own battles. From my point of view, 'ta-ta' is the same tongue gesture as 'da-da'; the two words are only differentiated by an unconscious change in the attitude of the false vocal chords, and by a later entry of the

vocal chord hum in relation to the tongue gesture in the case of 'ta-ta' than with 'da-da.'

"My point is that the association of a hand gesture in 'ta-ta,' similarly with that of the tongue gesture, indicates a relationship which still persists, and which was originally the foundation of speech. With regard to Mr. Nathan's suggestion, it will be interesting to see to what extent the same pantomimic principle can be traced in other branches of human speech."

### THE TEMPERING OF COPPER.

To the Editor of DISCOVERY.

SIR,

The old supposition that the ancients, and particularly the Egyptians and Babylonians, possessed a process of hardening copper and bronze which has since been lost, crops up again from time to time in periodicals. It is also to be found in some archaeological works. The late Professor Gowland, with a very wide experience of ancient materials, made it clear many years ago that ancient copper and bronze were hardened by hammering and not by any mysterious process. Very many specimens from eastern sources have been examined chemically and metallographically, and have been found to possess exactly the same properties as similar alloys prepared at the present day. Even so soft a metal as copper if hammered out to the form of a knife will take a fairly sharp edge, which is by no means durable, but has sufficient cutting power to be useful. Copper alone was, however, only used for a comparatively short time either by prehistoric races or by the Sumerians and the Egyptians. It was soon superseded by bronze, an alloy of copper and tin, and many of the ancient bronzes approximate to the composition 90 per cent. copper, 10 per cent. tin, which we still find to be the most useful alloy of the series. Such a bronze is initially much harder than copper, and when hammered out is considerably hardened and keeps a cutting edge much better. As a matter of interest I have just made the following experiments:—

A bar of copper, 1 cm. square, was hammered out cold on an anvil at one end until it was spread to a chisel form with a fairly sharp edge. The hardness was tested by the Vickers machine, which forces a diamond pyramid into the surface under a known load, the size of the impression being then measured under a microscope. The hardness figures given are expressed on the Brinell scale used by engineers. The bar of copper had an initial hardness of 87, which was raised to 135 by hammering. A similar bar of bronze, containing 9.31 per cent. tin, had an initial hardness of 136 and a hardness at the hammered edge of 257. A somewhat harder bronze, containing 10.34 per cent. tin, gave the figures 171 and 275 respectively. The figures for the hammered edges of the last two metals represent a very considerable hardness, and it is certain that the ancient tools were of this kind.

Occasionally other elements, such as arsenic and antimony, are found in bronzes, but their addition seems to have been accidental, and the ancient bronze founder almost invariably used tin.

The problem of the method of cutting used by the Egyptians for the deeply-incised figures on granite and other hard stones remains unsolved. Mr. Garland in his book has given evidence to show that Sir Flinders Petrie's process of grinding with copper and emery will not apply to all cases, and bronze tools do not seem adequate to the purpose. It would be worth while to make a systematic investigation of the possible means of

cutting these figures, which are remarkable for the sharpness of their angles.

Yours faithfully,

CECIL H. DESCH.

Department of Applied Science,  
University of Sheffield. 11th October, 1927.

The editor is indebted to the Mond Nickel Co. for the following further references to literature on this subject:—W. Davis, "The Story of Copper," p. 164 (Werner Laurie); H. Garland, "Researches on Egyptian Metal Antiquities," *J. Inst. Metals*, 1913 (2) p. 329; W. Gowland, "The Metals in Antiquity," Huxley Memorial Lecture, Royal Anthropological Institute, 1912.

# "BIRD-MIGRATION": THE AUTHOR'S REPLY.

To the Editor of DISCOVERY.

SIR,

Mr. E. M. Nicholson and Mr. S. L. Walkden having paid me the compliment of noticing my original article at some length, I cannot do less than reply, as briefly as possible, to their letters. Owing to lack of space my full reply to Professor Patten was not published. The excluded part, however, was relevant to the matters under discussion, as Mr. Walkden's letter in particular very clearly shows.

Professor Patten stated:—

"Full flapping flight (not as we often see it performed in half-measure by gulls leisurely following the ship), gives birds that wonderful mastery on the wing which enables them, on getting up sufficient speed, to pierce the air when necessity arises, and thereby removes them from the iron law of air-currents. No doubt aeroplanes and insects (with their rigidly stretched wings), are much more under the control of air-currents; heaven forbid, however, that the bright little, intelligent, sparkling-eyed bird, so full of life and powers of observation, should be thus enslaved."

I am not a professional scientist, and cannot enumerate "the seven most deadly scientific sins." I can hardly doubt, however, that to deny a vital and demonstrable fact (a law not a theory) which is, unfortunately for the Professor, at variance with a preconceived theory, must be among these scientific sins. As a layman, I cannot refrain from marvelling at the queer contradictions which the quoted paragraph contains. While seeming to admit that the Law of Currents is unbending, as indeed it must be if it is a law, it claims exemption on behalf of the birds, so dear to the heart of Professor Patten, and, as I must now add, of Mr. Walkden.

Do my critics admit, or do they not, that I have correctly stated a law? Do they believe that the action of the wind on a bird is different to its action on a giant airship or an aeroplane? Heaven does not forbid, on the contrary it ordains, "that the bright little, intelligent, sparkling-eyed bird, so full of life and powers of observation," is thus enslaved, with all the far-reaching repercussions on modern biological theories that this simple little fact gives rise to.

In my original reply to Professor Patten I stated that I did not intentionally suggest that "inherited knowledge" is a human characteristic. If my wording implied such a foolish suggestion, I owe an apology for faulty wording. Mr. Nicholson pleads guilty to a feeling of "depression" at the frequent "mistakes" exhibited by responsible scientists on a vital aspect of dynamics. But why has not "depression" given place to "action" on the part of some scientific ornithologist of standing?

"Problems of Bird Migration," by Dr. L. Thomson, leaves on my mind a rather confused glimpse of mutually destructive theories, and doubtful observation, though the few clearly reliable facts are in startling accord with the law I have endeavoured to enunciate. Mr. Nicholson's reference to the behaviour of birds at high altitudes confirms, and does not impeach, the exact accuracy of my remarks on single medium operation.

The question of "memory" has been touched upon in my second article.

That there is no correlation between temperature and the regular migrations of the famous south and north flying migrants is not a doctrine, or belief, common to scientific ornithologists. The absence of discrimination in the use of the term "migration" is one of the most noticeable features of "Problems of Bird Migration," and in this and other books it has been noticed that all movement, even of a few miles, is termed migration. I have endeavoured to show that among the hardy birds, and especially those living in open and exposed spaces, this unceasing ebb and flow of movement is merely the effect of the strain imposed on relatively slow fliers of maintaining themselves in a particular neighbourhood on an ever-moving "platform"—if I may use the term with reference to flight.

In concluding his letter, Mr. Nicholson says with all truth that "theories are easy but facts are hard." The Law of Currents in its two aspects is a mathematical fact, not a theory, and its faithful application to the innumerable observations and theories at present surrounding the life of birds on the wing is capable, in my humble opinion, of reducing an apparent chaos of movement to a perfectly simple and intelligible order. On page 94, "Problems of Bird Migration," it seems that Stubbs came very near to postulating the law that must for all time govern the flight of birds. He seems, however, to have failed to insist that he was stating law, not theory, and he seems further to have failed to grasp the enormous significance of the facts he partially perceived.

Dr. Thomson states:—

"It is argued that once a bird is launched on migration flight its direction must be greatly affected by the movement of the whole body of air in which it moves. . . . These factors, of course, vary from day to day and from hour to hour, so that even birds departing at short intervals from the same point and in the same initial direction would necessarily be borne on different, sometimes widely different, courses. The theory, however, seems to prove too much."

Thus is an unchanging law of dynamics dubbed a theory, and treated as such, because, forsooth, it invalidates some preconceived ideas essential to over-zealous biologists. This matter is treated in some detail in the October number of the *National Review*.

Mr. Walkden merely echoes the ordinary evolutionary ideas of Professor Patten and, if I may say so without disrespect, confirms his fallacies. Some misunderstanding seems to exist on the ability of birds to "pierce the air." Birds obviously pierce the air at the speed of their own natural flight. They cannot, however, pierce the *wind*, which is the appellation given to the bodily movement of the air by earth-bound mortals. To the movements of the birds through air has at all times to be applied the movement of the air itself, in order to arrive at the course and distance made good over the land or sea.

I am, Sir,

Yours faithfully,

Maidenhead.

B. ACWORTH.

3rd October, 1927.

## Invisible Music.

By Edward Liveing, M.A.

Manchester Station Director, British Broadcasting Corporation

*If there are any who imagine that the possibilities of wireless music have been fully explored, their opinion will be revised by this further article in Mr. Liveing's series on "Broadcasting: A New Social Force." Discussing listeners' problems the author here deals with the reception as well as the transmission of music.*

THOMAS CARLYLE wrote of music that it is "a kind of inarticulate, unfathomable speech which leads us on to the infinite." This is perhaps one of the most suggestive definitions ever given to music though many remarkable tributes have been left behind by poets and writers of all the ages. Goethe wrote that "the worth of art appears most eminent in music" and it is generally agreed that music is the highest and most spiritual of all the arts. Its application to broadcasting, or the application of broadcasting to music, if we put it that way, is therefore a matter of the greatest importance. This article is definitely that of a layman in music, but a music-lover, and it is possible that a layman can look at some of the fundamental issues involved in the effect of broadcasting on music more neutrally than a musician.

### An Expert Problem.

Firstly, we need to consider the degree of exactitude in reproduction of which the microphone is capable. This is no easy question to answer. Remarkable strides have been made in the perfection of the microphone and of transmission in this country. On the whole, too, much better receiving apparatus is used by listeners to-day than was used three years ago, though it is doubtful if more than one in ten listeners owns a set and aerial which can be described as being as near as possible to perfection. Improvement is rapidly being made at the transmitting end and fairly rapidly at the receiving end, and in ten years' time there is no knowing how perfect broadcasting and listening will have become technically. Even then, however, how can we compare aural reception through the microphone, the air and the receiving set, with aural reception direct? It may be that microphones will be invented of greater sensitiveness than the human ear. Such an invention would in itself abolish what might to-day be a legitimate criticism of broadcast music, namely, that it is not an absolutely accurate reproduction of the original sounds. I must admit that I can only theorize on this aspect of wireless music, but I am inclined to think that even the experts can do no more.

If, however, we admit that broadcast music does not reach our homes to-day with the perfection of the original music as heard in the studio or the concert hall, we must also admit that it has certain very distinct advantages. To the individual it offers the decided advantage of allowing him to sit in his own home and listen without any distraction. Through his loudspeaker or his head-phones issue the strains of, for example, orchestral music, cleansed, as it were, of the human elements that are producing it by their very passage through the ether. He is free from the jarring appearance of the ugly halls in which so much music has to be produced to-day, from the habits and fussiness and distractions of the crowds of people around him, and, moreover, from the actual sight of the various instruments used. To many music-lovers and, naturally, to musicians, the lack of sight of the conducting and composition of an orchestra would prove a distinct disadvantage from the point of view of following the technique of performance. To me, and I should imagine that others will share my view, a conversion of Keats' lines in his "Ode on a Grecian Urn" would aptly apply:—

"Seen melodies are sweet,  
But those unseen  
Are sweeter still."

There is this to be said for this point of view, that the very lack of visual images leaves the mind clearer to appreciate the value of the auditory images and thus places the listener more closely in touch with the mind of the composer himself at the moment when he first conceived the music. He hears, in fact, the melodies and harmonies as they first took their texture in the creator's mind. Thus wireless might be said to offer a highly spiritual expression to a spiritual art.

And so it seems to me that we could cover the fundamental advantages and disadvantages of broadcast music in a sentence or two, by saying that broadcast music has the disadvantage of not being an exact replica of the original, but the advantage over the original of giving to the listener sounds that stir emotion within him more freely inasmuch as his

emotions are in no way distracted by unsuitable concomitant visual images. These statements apply chiefly to orchestral music, but in general and with slight modifications they may, I think, be applied to instrumental, vocal, choral, operatic and organ music.

Turning to the social aspects of broadcast music, I do not think that we shall find much dissentient opinion to-day. There is no doubt whatever that broadcasting has wrought a vast change in the musical interests of the average individual. People who never before had the opportunities of attending symphony concerts, operas, and recitals, have now had them brought into their own homes. They have listened to the world's masterpieces of music, whereas in pre-broadcasting days the limits of their musical interests scarcely ever ranged outside the boundaries of musical-hall tunes and the lightest operatic medleys. The British organization has made a very definite attempt, without excluding music of a light nature, to raise the standard of the public's musical taste, and it has been strikingly interesting to one behind the scenes to have watched the musical development of the average listener. Three or more years ago the cry was all for dance music and "light and bright" music. Fashions have changed and modern dance music, according to one's correspondence, is now in very small demand, while letters from persons who cannot spell their words or easily express themselves are frequently received, expressing appreciation of operas and highly classical music.

#### Controlling Volume and Tone.

The actual technical improvement of transmissions has already been mentioned. Not only has the mechanical apparatus been developed so as to give a more perfect reproduction of sound in studios and outside halls, but other steps have also been taken. The volume and tone of all highly important musical programmes is nowadays "controlled" by expert musicians. The controller sits with headphones on his head and with the necessary musical score in front of him, and by means of adjusting levers can anticipate crescendos and diminuendos and in general bring out the emphasis and beauty of a song or an orchestral performance to the full. Mechanical methods have also been perfected for introducing the right quantity of echo into studio performances, through the establishment of special echo-producing apparatus; the echo can, so to speak, be mingled in the music up to whatever strength may be considered requisite. Scientific balancing of choirs, orchestras and other combinations in the right positions in relation to the microphone is a matter to which the most careful

attention is paid in the studio in order to prevent certain instruments or voices drowning or in other ways spoiling an *ensemble*. Wind instruments must be placed further from the microphone than strings, sopranos further away than contraltos, and there are many more complex gradations other than these general differences which need to be observed.

#### Scarcity of Music.

During the course of four years an immense demand has been made by broadcasting on the store of Western music; it has been ransacked over and over again, and to-day the broadcaster is frequently confronted by the difficulty of finding classical or more modern music which has not already been performed over the wireless many times. Several of the broadcasting organizations have arranged competitions to bring to light new composers, and it may be that in course of time a school of composers will come into being who will write works primarily suitable for the wireless medium.

The most materially important effect of broadcasting on musical life from the social point of view lies in its ability to organize, arrange or subsidize big musical events in public. In England, for instance, where the claims of state opera and concerts have so often been urged in the hope that appreciation of good music might be raised to the level which it had attained in Germany, the broadcasting organization run on a monopolistic basis has had sufficient funds to make important progress in this direction. One need only cite the taking over of the Promenade Concerts this year at the Queen's Hall, the running of many international concerts in the Albert Hall, the subsidizing of the Hallé Concerts in Manchester, and of the British National Opera Company, to show the position that the organization has assumed in the musical life of the country. One can look forward to the day when broadcasting in all countries of the world will be the prime-mover in musical life, if, in fact, it is not already so to-day. With the right control of broadcasting, there is no need for fear of its exercising deteriorating effects on music.

Before concluding this article, I think we might well mention one special art-form in relation to broadcasting. This is opera. To those who have always looked on opera as something of a hybrid art, one cannot help feeling that broadcast opera offers a satisfying alternative to stage productions. Broadcast opera has become a form of music which offers the listener something in which there are no discordant elements, and which can be taken by him as a musical fantasy in which voices and music mingle in a harmonious *ensemble*. To those who like to attend



operatic productions and who are prepared to overcome within their imaginations the somewhat unrealistic atmosphere promoted by the emotions of life, necessarily strongly stressed in their musical attire, and the rather incongruous appearance of artists who are often suited to their parts vocally rather than from any other reason, broadcasting has come to subsidize and keep this art-form alive where no other agency, at any rate in England, appeared to have strong hopes of succeeding on a permanent basis.

At one time and another comparisons have been made between broadcasting and the gramophone, and all kinds of fears have been expressed that broadcasting might damage the gramophone industry and

*vice versa*. It has, I think, been clearly shown in the last year or so that, far from these two new media of expression competing with each other, they have both been able to complement one another in the great work of supplying the public in their own homes with the musical masterpieces of the past and the present.

Music claims the largest place in the programmes of nearly all broadcasting agencies. It is only fitting that it should do so. The dissemination of beauty in musical form through the air day by day and night by night must exercise a spiritualizing influence, the full social value of which, in the civilization of to-day and the future, cannot be underestimated.

## Shakespeare and the Influence of the Stars.

By Professor D. Fraser-Harris.

*A new study of his references to the stars suggests that Shakespeare held unorthodox views about the astrology of the times, though he was well acquainted with its significance.*

WE have almost forgotten how completely in former days the destinies of man were supposed to be influenced by the heavenly bodies. Yet our everyday language bears constant witness to it. The very word "disaster" comes from the Latin *aster*, a star, and is equivalent to our "ill-starred," the "dis" having the force of "ill" or "bad." Our word "consider," from the Latin *sidus*, *sideris* a constellation, takes us back to the time when conjunctions of planets with constellations were regarded as a matter of the gravest importance for human destiny.

We still hear people say that so-and-so was or was not born under "a lucky star"; and the expression "my stars!" may occasionally still be used. To speak of a man's fortune as being in the "ascendant" is pure astrology, for the ascendant was the condition of a star rising from the horizon towards its highest point in the sky. The phrase a "heaven-sent" ruler is astrological. Shakespeare, reflecting faithfully the beliefs of his day, recognizes that the stars were held to bring good as well as bad luck. Thus says Helena in *All's well that ends well* (I, 1) :—

"Monsieur Parolles, you were born under a charitable star."

Katharine in *The Taming of the Shrew* (IV, 5), exclaims :—

"Happier the man, whom favourable stars  
Allot thee for his lovely bed-fellow."

And, says King Richard III (IV, 4), "Be opposite all planets of good luck to my proceeding." Again, "Lo, at their births good stars were opposite."

Doubtless it was oftentimes bad luck that the heavenly

bodies were supposed to bring, and in particular plagues and pestilences. Serious and eminent doctors of medicine believed this far on into the seventeenth century. Biron, for instance, in *Love's Labour Lost* (V, 2), declares : "Thus pour the stars down plagues for perjury"; and still more explicitly *Timon of Athens* (IV, 3) exclaims in his harangue to Alcibiades :—

"Be as a planetary plague when Jove  
Will o'er some high-vic'd city hang his poison  
In the sick air."

We hardly realize that according to astrology the host of heaven possessed life, were in fact living beings, sympathetic intelligences sharing in man's joys and sorrows, which was not after all very extraordinary seeing that they were supposed to have predestinated them! In nursery lore children used to be told that they were stars before they were born, and that after death they will return thither. Faithful dogs went to the dog-star or Sirius. This aspect of the matter Shakespeare faithfully represents when he makes *King Lear* (I, 1), use the expression :—

"By all the operation of the orbs  
From whom we do exist and cease to be."

as though the stars were admittedly living persons. This belief that the stars took an active interest in human affairs and shared in the joys and sorrows of mankind was deeply rooted. Thus Oberon (*A Midsummer Night's Dream* (II, 2)), informs us that :—

"Certain stars shot madly from their spheres  
To hear the sea-maid's music."

In this connexion we might remember the expression

in the Book of Job: "The morning stars sang together." Of course not only stars but comets took an interest in the affairs of men, especially those of the prominent ones, so that it would seem that in their assumption of human characteristics even the celestial beings had not succeeded in eliminating the inherent snobbishness of human nature. Hence Calpurnia (*Julius Caesar* (II, 2) was only expressing what everyone believed when she declared:—

"When beggars die there are no comets seen;

The heavens themselves blaze forth the death of princes."

But Shakespeare's magnificent intellect was too penetrating to accept uncritically the notion that the sun, moon and planets, fixed stars, comets and meteors actually determined the destiny of each individual human being! Hence he makes Cassius in the same play utter those memorable words:—

"Men sometimes are masters of their fates;

The fault, dear Brutus, is not in our stars

But in ourselves that we are underlings."

In other words, "Man's his own star," as John Fletcher, Shakespeare's contemporary, put it. The anthropocentric aspect of the universe was beginning to become a dissolve view. A few men in all ages had doubted the highly unscientific teachings of

astrology; Cicero, Juvenal, and La Fontaine, to name no others. It was Jonathan Swift who dealt astrology its death blow in 1708.

In the tragedy of *King Lear*, Shakespeare gives us the two views side by side—the old or orthodox, and the new or sceptical. The former is expressed by Gloster (I, 4), who begins, "These late eclipses in the sun and moon portend no good to us," and then goes on to enumerate all the things that have recently gone wrong, to which Edmund replies: "This is the excellent foppery of the world that when we are sick in fortune (often the surfeit of our own behaviour) we make guilty of our disasters the sun, the moon and stars." He then proceeds to pour contempt upon these ancient and self-centred beliefs—"as if we were villains by necessity, fools by heavenly compulsion, knaves, thieves and traitors by spherical predominance; drunkards (and) liars by an enforced obedience of planetary influences." There is more in this fourth scene of *Lear* to the same effect, quite enough to show us that the author of that tragedy was very well acquainted with the astrological lore of his time, but as for himself in his heart of hearts he did not believe one word of it.

## An Appreciation of Sir Arthur Shipley.

WHILE our October number was in the press, news was received from Cambridge of the death of Sir Arthur Shipley, G.B.E., F.R.S., Master of Christ's College. The many writings which appeared over his signature made Sir Arthur's work familiar to a wide circle of readers, his book reviews in particular being characterized by clear expression and a lively humour that gave assured interest to everything he wrote. An appreciation of his distinguished research as a zoologist will be contributed shortly by one qualified to deal with this aspect of his work; meanwhile, some notes from the editor's papers may serve as a slight appreciation of the deep personal interest which to the end Sir Arthur Shipley maintained in the affairs of *Discovery*.

I first met the Master of Christ's at one of the informal gatherings in the Lodge, which he used to hold regularly on Sunday evenings throughout term. To this I had been taken by his nephew, whom I chanced to meet in a medical course we both attended and who had told him of my connexion with Princeton, where I had studied for a year before going up to Cambridge. Sir Arthur had long been a frequent visitor to the United States, and he had a particular interest in Princeton University, at which he was the

recipient of an honorary degree when he went there in 1918 as head of the British Universities Mission. My recollection of our earliest conversation is that he had decided opinions about Prohibition, but I was delighted to learn for myself of that deep insight into the American point of view and sympathy with their educational system, that made him so many friends on the other side. While he had in the eighties "acquired the Transatlantic habit"—to quote his own phrase—when his turn came to be Vice-Chancellor in 1917, Sir Arthur took full advantage of his office to extend British influence in counteraction of the somewhat strong German interests then prevailing in American academic circles.

As he pointed out himself in *Discovery*, while the influx of teachers from Europe during the last half of the nineteenth century brought a wider outlook than had hitherto prevailed in the States, the influence of the Germans had become very marked; the cheapness with which they distributed their Ph.D. degree to American students attracting a return current of young men from the Old World. When in 1920 his name appeared in the small list of G.B.E.'s it was recognized, as *The Times* memoir stated, that this high honour was conferred not merely on the Vice-

Chancellor of the University of Cambridge, but on a man who had given unwearied and valuable services to his country. The official mission to America followed many months of other strenuous war work; in addition to organizing various university schemes, the Master had already thrown open his own Lodge to wounded officers.

Early in 1926, when the present editor began work, a valued friendship formed as an undergraduate was continued in a new sphere. Sir Arthur had, of course, contributed regularly for some years, but an added enthusiasm was apparent when he wrote to me on 3rd March: "I am delighted to see you have taken over *Discovery*. . . . Cannot you come down for a night soon and talk things over? There are one or two things I would rather say than put on paper. Anyway I want to see you. It is quite a long time since I have had that pleasure." When the visit came, one of his first characteristically generous concerns was that an adequate review should be given to "A Sportsman's Cookery Book"—a work by the retiring editor that evidently delighted him, while he also wrote to Major Pollard appreciating the editorial connexion which had then just ended.

The contributions to which Sir Arthur attached most importance were those dealing with microscopic life, many types of organism being covered in his series of articles that appeared at irregular intervals from June, 1923, until September, 1926. He had already arranged to reprint them as a book, to be called "Hunting under the Microscope," and the publishers hope at an early date to issue this volume posthumously, one of Sir Arthur's last letters showing his keenness to add another title to his list of works.

Of late years these had been of travel rather than of scientific interest, and his love of reminiscence was specially marked in the articles that followed his most recent journeys to the Carribean. Forty years ago he was sent out by the Government to investigate plant disease in the Bermudas, and since the war his active interest in the newly-formed Imperial College of Tropical Agriculture had several times taken him to Trinidad. Soon after his return from a final voyage, as we recorded last May, Sir Arthur had an illness that almost proved fatal, but so remarkable was his recovery that in a very short time he turned once more to his pen. "I hope you will take it," he wrote me about his article on "Costa Rica," "as I think people who are getting a little tired of the Mayas would like to know something about people who occupy their realm. . . . I am still very weak but am getting better." When the proof reached him a week or two later, Sir Arthur replied that he



SIR ARTHUR SHIPLEY, G.B.E., F.R.S.

was "dreadfully hampered by rheumatism in the knee which, added to my weakness consequent upon my illness, reduces me to a state of inaction." Perhaps, however, the pain he suffered in recent years, of which only those who knew him intimately were fully aware, served to increase his almost boyish delight in humour of situation. A passage I recall as typical of this vein in his writings occurred in a review of an American zoological work:—

"Italian fleas are commonly assumed to be fleas *par excellence*, though some maintain that the Californian flea is superior. It certainly holds the record for the long and the high jump. But the author speaks of a flea about a quarter of an inch in length living on field mice. Like the Executive of the United States Government this awe-inspiring insect is confined to the District of Columbia."

"I doubt," he wrote of the different American terminology employed elsewhere in this book, "if any self-respecting European flounder or cod would consume molluscs with such names."

Apart from reviewing, in which he was tireless, Sir Arthur was ever ready to advise on editorial matters. He wrote on 26th July: "I am off to the South Coast to-day, and as you can imagine I am in a great fluster," but almost the last letter to me which he signed himself (dated 1st June) was curiously reminiscent of the first: "I do want to see you sometime about the future of *Discovery*."

It is a great regret that opportunity was not at once

made to visit Sir Arthur Shipley again, but perhaps in conclusion I may record an earlier experience that will always be a cherished memory.

His care in restoring Christ's College Lodge and the portrait of himself in Vice-Chancellor's robes, which for a time decorated his study, were suggestive of Sir Arthur's love of traditional ceremony and beauty. He always made guests feel at home but was not unconscious of the respect due to his position; he liked to be called "Master" in preference to his other title. One evening I received word that an informal reception would be held to Princeton men resident in Cambridge,

the invitation reaching me through one of their number. I suppose this American student thought it unnecessary to tell an Englishman how to dress. Anyway, in ignorance that the Master was in fact entertaining a Princeton Trustee and his wife, I arrived in morning clothes at what I imagined would be a typical "Sunday" gathering. Shown into a full dress company I found myself apologizing in my embarrassment as I shook hands with the Master. "My dear Benn," he said at once, "it's not what's on you but what's in you that matters."

J. A. B.

## The Beaver in Western Canada.

By Dan McCowan.

Naturalist at Banff, Alberta.

*The symbolic animal of the Dominion that this year celebrates its Jubilee, presents much of interest still to be investigated. Certain details of the beaver's building operations have yet to be explained.*

IN adopting the beaver as the symbolic animal of Canada a wise choice was made, for of all the creatures of the wild the beaver has had the greatest influence in bringing civilization and settlement to the Dominion.

### The Hudson Bay Company.

In the year 1670, the "Governor and Company of Adventurers trading into Hudson's Bay" became overlords of nearly one-third of the entire area of North America, in consideration of payment to the King of "Two Elk and two Black Beavers." Immediately on the coming of this great company the beaver became a unit of value in all commercial dealings. Valuable skins were bartered by the Indians for such trinkets as they coveted; the lure of the beaver brought trappers and traders from many lands. Keen competition amongst these pioneer dealers, resulted in the establishing of forts and trading posts throughout the great uncharted regions of the north and west. Thus was the way paved for the coming of agricultural and industrial people, who turned the wilderness into wheat fields and who founded cities upon the scarce cold ashes of the Red Men's camp fires.

The beaver is the largest and most intelligent member of the rodent species. It is a heavily built, round-bodied animal, weighing from thirty to forty pounds. The legs are short, particularly the fore legs; the hind feet are large and webbed, the toes having short stout nails. The beaver's tail is a large, naked, scaly, paddle-like appendage, measuring, on an adult animal, over a foot in length and six inches in

breadth. It is extremely serviceable as a rudder, and when loudly slapped on the water serves as a danger signal to the other members of the colony. The teeth of this four-footed forester are long, strong, and chisel sharp as befits a creature of tree-gnawing habits. The eyes and ears, in proportion to the heavy body, seem small. Secreted in a sac in the body of the beaver is a musky substance called Castorum, at one time a valuable commodity used in compounding medicines and perfumes. Hence the name Castor Beaver. The fur is composed of long, dark brown hairs, overlying a thick coat of silky under-fur, fine in texture and unexcelled in durability.



BEAVER CUTTINGS, SHOWING APPROXIMATE SIZE.

The powers of the beavers are quite extraordinary, whole areas being cleared of trees by their activities. The trunks seen here are four feet in circumference.



Beavers are believed to mate permanently. Families consist of from four to six young, which remain with the parents for nearly two years. This highly-developed social instinct results in colonies of considerable size being formed.

The animals are found living in dome-shaped houses built from the trunks and branches of trees, these houses being placed in a pond which has been formed by construction of a beaver dam. The mud necessary to cement the dwelling and to render it weatherproof is taken from the bottom of the stream, carried in the fore paws, and added to the structure as it is being erected.

A coating of wet clay is then placed upon the roof of the house when the first severe frost is imminent. This mortar when frozen serves to render the residence of the beaver family impregnable to attacks from wolverines and other enemies of the



BEAVER DAM AT BANFF, CANADIAN PACIFIC ROCKIES.

This structure is five feet in height and fifty feet across. How the beaver causes tree trunks to sink at a particular chosen spot in the stream is still a mystery.



ASPEN POPLARS CUT BY BEAVERS.

Tree felling is accomplished by gnawing two rings, about eighteen inches from the base, the wood between being then gouged out.

species. The entrance to the house is under water, but the living chamber is entirely above water level. Placed upon the floor of this single apartment dwelling, are small sticks and chips of wood that serve as a "grid" to drain the water which, dripping from the bodies of the incoming animals, would otherwise make a puddle of the interior. The beaver is extremely sanitary in habit, and thus there is seldom an outbreak of disease in the colony.

Beavers live chiefly upon tree bark, and this circumstance, together with the necessity of obtaining material for dams and houses, entails the felling of many trees, an operation in which the animal is singularly proficient. With their strong, sharp teeth they gnaw a double ring around the tree trunk, usually about eighteen inches from the base. The wood

remaining between these rings is then gouged out and the tree crashes to the earth, to be at once cut into short lengths and either hauled overland or floated down stream to its destination. In this manner large and heavy logs are transported by these muscular animal "lumberjacks."

That beavers habitually cause timbers to sink in a chosen spot on a stream or pond is a well-known fact. By what means this feat is accomplished is still a mystery to mankind. The bark upon the sunken logs and branches provides food for the winter months. Deep down under the ice this food is stored, and is thus available when the snow has rendered it impossible for the beaver to secure his food as he does during the summer. The bark most esteemed by beaver is that obtained from aspen poplar, willow, or birch. In summer the roots and stems of aquatic plants provide food for these vegetarian creatures.

#### A Beaver Delicacy.

As a food animal the beaver was never rated highly. The Earl of Southesk, whose adventurous spirit in exploring strange lands was almost equalled by his gastronomic experiments with strange foods, in writing his opinion of beaver tail, a much lauded delicacy amongst Canadian pioneers, remarks, "It tasted like fat pork sandwiched between layers of finnan haddock."

Beavers are prolific animals, and when given reasonable protection increase rapidly. Having successfully withstood two hundred and fifty years of intensive commercial hunting, and being yet present in large numbers in all provinces of Canada, there is little likelihood but that this symbolic animal of the Dominion will continue to exist for long in this wide land.

## Broadcasting and the Press: A Journalist's View.

By F. E. Hamer.

*In a friendly rejoinder to Mr. Liveing's September article—which discussed the relations of broadcasting and the press—a life-long journalist suggests that our contributor's views need supplementing. By an appropriate coincidence, Mr. Hamer was for many years connected with the "Manchester Guardian," in the city where Mr. Liveing now directs the B.B.C.*

HOWEVER colourless and impersonal Mr. Edward Liveing may be when he is speaking the authorized word into the microphone, there is plenty of colour and personality in his article on journalism and broadcasting in the September issue of *Discovery*; the broadcaster for the moment has gone to sleep and the journalist, very much alive, has stepped into his place. His pleasantly provocative generalizations, which one protests against and welcomes in the same breath, have all the insight, emphasis, life, over- and under-statement of a case, which the journalist constantly employs in his art and have become almost a part of his art. He writes, indeed, from a definite personal point of view, which would not be permissible in the studio and which obviously implies other points of view from which the subject would appear different. And that is part of its fascination. It is not a cold, perfectly balanced, mechanical photograph of things just as they are; it is a vivid sketch in colours of things as the artist sees them, suffused with life and personality. And the artist's eye may yet give a more perfect vision in the true sense than the finest optical glass. This, like other generalizations, may stand as the general distinction between the colourless and commentless announcement of bald facts by wireless and the vivid presentation of news by a living and imaginative mind. Mr. Liveing, letting himself go in the pages of *Discovery*, is immensely more interesting than Mr. Liveing speaking like a perfect machine words from which every trace of feeling, motive, emphasis, and personal conviction have been carefully filtered.

### Essence of Journalism.

Unconsciously, perhaps, but undoubtedly there is something of reproach and reproof in Mr. Liveing's statement that "there are hardly any papers which have been able to keep themselves free from political and class bias." Why should they? To divest themselves of such "bias" would be to divest themselves of the essential feature of journalism, and to reduce themselves to gramophone records, each telling the same story in exactly the same way. Could anything be more dismal? A speech by Mr. Baldwin, recorded in print in identical terms in every newspaper

in the country as it is over the wire, would be terrible; but a speech by Mr. Baldwin, presented in fifty different ways, all varying in emphasis, estimate, and point of view, cursed here, blessed there, becomes a thing of human interest. This is not really bias; it is art, which sees and presents the same thing in fifty different ways. Nor is it base deception of the public; it is all perfectly well understood; the readers like it, and so readers are won and retained.

### Legitimate Propaganda.

The retired colonel likes his news as presented by the *Morning Post*; at the other extreme is the *Daily Herald* or *Sunday Worker*. Because the *Church Times* represents frankly the Anglo-Catholic party, it is not perverting facts, but merely maintaining a certain point of view; the *British Weekly* is no more practicing deception when it speaks for liberal Nonconformity. It is legitimate propaganda, not wilful bias, evolved by a process of natural selection. To eliminate all this from journalism would be, not to "cleanse," but to sterilize it. Broadcasting has, indeed, attempted to import something of this personal touch into its debates by representing different sides of a problem; but the game as played in the studio is a sedate, pre-arranged anaemic affair compared with the rough-and-tumble newspaper sport, in which the players have to be as fit and resourceful as those in the cup final. The one is a ladylike drawing-room game, the other genuine open-air sport.

Moreover, the sedate methods of the studio would be fatal to newspaper enterprise. The newspaper has to catch its reader where it can—in the street, rushing to or from home, in the train, on the bus, anywhere and everywhere in fact. The announcer has his victim, so to speak, already on the chain, and shoots at a stationary target, while the newspaper has to pot him on the run. Hence the more mobile, less conventional methods, that have to be called into play. Let the Broadcaster, when tempted to look down upon his poor relation the Journalist, remember the two gentlemen who went into the temple to pray!

From the journalistic side, two features mentioned by Mr. Liveing are of intense interest—the running

commentary and the eye-witness account. It is a long time now since the sporting reporter introduced the former. It was always one of the Press Box joys for the special correspondent who could leisurely note the points in the game for calm survey in his column article for next day's morning daily, to hear his breezier colleagues of the evening press dictating their comments as the game proceeded. Every now and then a gem was heard which sent the whole box into a roar. The B.B.C. probably employs a more highly educated and intellectual class for this extremely difficult work, but I am not sure that they have yet perceptibly advanced the art. The practice of employing two commentators instead of one may, or may not, be good. The laborious attempt they sometimes make at natural spontaneous comments between themselves sounds to me dreadfully artificial. "I say!" exclaims one, "that was cool, wasn't it?" "What?" "Why, didn't you notice? Just before shooting he stopped to blow his nose." "By Jove, how jolly sporting." "Yes, so English, don't you know." "Quite." This sort of thing wants to be done supremely well or not at all, and so far I have not heard it done supremely well either by the sporting reporter or by the B.B.C. commentators. It resolves itself generally into a painfully artificial effort to be natural. One good commentator in my opinion would be better—a man who thoroughly knows the subject, who can pick out instinctively the points an intelligent spectator would himself see, and just

think aloud without attempting to be too clever. A good eye, a quick brain, a sure judgment, and a clear descriptive tongue! If the commentator could forget that he is addressing the universe, eliminate from his consciousness the desire to say clever things, and just tell the story as if he were telling it to a pal at the club who could not be present but wanted to know all about it, the effect might probably be improved.

The eye-witness accounts seem to me much more successful. I have listened to several with real pleasure, and thought some perfect. Here, again, it is a journalistic idea in process of adaptation. One goes to a new play, or a game, or a great ceremonial, and certain impressions remain. To compare these with the impressions of friends is natural. It is always a pleasure, in opening one's paper next morning, to read what a competent judge says of the affair, noting with a gratified vanity that he has observed the points that struck you at the time, mentioning others you had missed, modifying favourable or unfavourable opinions you may have formed. That is what the B.B.C. eye-witness does remarkably well. It is informed, expert criticism and estimate, and helps to form in the listener-in a sound critical habit. Moreover, it has to be done even more rapidly than the written article, for within an hour or two of the event one sometimes gets an admirable descriptive analysis and judgment. It is journalism quite at its best.

## Speedwriting : A Scientific Shorthand.

*Some while ago a brief paragraph announced the introduction into this country of a new shorthand which hails from America. One of our reviewers has studied the system and here discusses it in more detail.*

A GREAT many people have tried at one time or another to master some system of shorthand. Those readers of *Discovery* who are students, and have to take down notes of lectures, and all the many people who like to jot down notes on books they are reading, speeches they have heard, or simply ideas as they flash through their minds, are accustomed to use some form of abbreviated writing. In fact many abbreviations of the King's English are almost standard. Apart from the normal conversational habit of shortening I will to "I'll," there are Xmas for Christmas, C19 for The Nineteenth Century, and, among journalists, i for in, o for of, t for the, etc. But few people bother to go beyond these simple short-cuts. To go further means to learn some kind of shorthand, that is, to settle

down to the slow and painful process of mastering a completely new set of symbols and signs, entirely unlike the letters of the alphabet, so easily (or so it seems now) learnt in childhood.

Those who have to go through this painful process in order to become shorthand typists usually attain some degree of proficiency in time, but even when the system has been learnt, the strange hieroglyphics seldom convey anything to anybody except the person who wrote them. A beginners hieroglyphics may for a time resemble those in the exercise book, but individual variations soon appear. This is particularly true among scientists. The story of the scientist who made a world-important discovery and died before revealing its nature, only leaving behind

unintelligible shorthand notes may be uncommon, but it illustrates very forcibly the weakness of the old system.

That this fundamental weakness is common to all the various shorthand systems has long been realized, but it was not until recently that an effort was made to evolve a scientific method of abbreviated writing. The attempt—an entirely successful attempt—was made by an American, Miss Emma Dearborn, who had had much experience of teaching shorthand and was consequently well aware of its drawbacks.

The result of this attempt was Speedwriting. Miss Dearborn's Speedwriting, like all great discoveries, is so simple that one wonders that nobody ever thought of it before. It begins with the simple idea of using the ordinary letters of the alphabet, and proceeds to carry the natural conversational habit of condensing "I will" to "I'll" to its logical conclusion. Another natural habit, the habit the mind has of connecting "not only" with "but also," neither with nor, and so on, is also used. In brief, the method is simply a scientific condensation of the English language.

Once the idea of Speedwriting has been grasped, its many advantages are obvious. Any student of the system whose normal handwriting is fairly legible,

after very little practice can easily take down a speech. His notes of the speech can then be passed on to any other Speedwriter, who can translate them rapidly into longhand. It requires little imagination to visualize the day when, thanks to this system, the newspaper reporter will be almost superfluous. In future men in the Press Room of a London newspaper will listen-in on the wireless to a speech being made by the American President in Washington, and will take it down direct on to their typewriters in Speedwriting. The typewritten pages will then be handed straight to the compositor, who will set up the speech and produce galleys for the proof-reader with the minimum of delay. Imagine a compositor attempting to work from ordinary pencil shorthand notes!

Speedwriting is, in fact, an almost ideal method of abbreviated writing. Its adoption should soon be universal. But if there is one thing that can prevent this desirable state of affairs it is the price which is being charged for the books which teach the system. One ventures to suggest that the Brief English Systems, Inc., the holders of the Speedwriting copyright, would be well advised, both for their own and for the public's profit, to offer this wonderful system at a somewhat lower price. E. G.

## A Unique Statuette Discovered in Crete.

THE thrill of the unexpected is an experience which may at any moment come to the explorer in Greek lands, though in modern days the choicer relics of antiquity seem more often to come by unseen devious routes to the notice of the world. The pick of the learned excavator has laid bare a Praxitelean Hermes, and in more recent days the archaic portrait thought to represent the features of Leonidas. But how often is he denied the first sight of what should be his choicest rewards! The Ludovisi throne, the two great archaic statues of standing and seated goddesses in the Berlin Museum, the Cypselid gold bowl and the ivory snake goddess from Crete which belong to the Boston Museum, and the Fitzwilliam Cretan marble statuette, are all treasures which have appeared, most of them during very recent years, with the exact details as to their origin unknown.

The Fitzwilliam statuette which is the subject of Mr. Wace's book\* is thought to have been found in the ruins of the harbour town of Knossos east of Candia

in Crete. It is a small figure nearly nine inches high, composed of two pieces of poor marble, the upper half being pegged into the lower portion at the waist, a method of construction employed in terra-cotta figures found elsewhere in Crete. When brought to Cambridge the statuette was in several fragments, but only the right hand and a small part of the head-dress were lost. A standing female figure is represented, her hands extended in front just below her breasts. She wears a tall head-dress, a close-fitting bodice cut low in front to expose the breasts, below which it is supported by some ancient equivalent for whalebones, a flounced skirt, and an apron which falls nearly half way down the skirt in front and at the back, but which leaves the sides of the skirt exposed.

Comparable figures in ivory and faience are known from Cretan sites, but this work is unique in that it is made of marble. As might be expected this essay in a harder material is far superior technically and artistically to the faience figures. Only the ivory snake goddess in the Boston Museum can compare with the Fitzwilliam statuette in artistic skill and

\* "A Cretan Statuette in the Fitzwilliam Museum: A Study in Minoan Costume." By A. T. B. Wace. (Cambridge University Press. 10s. 6d.).



beauty; and so absolute is the mastery of the artist over his material that small masterpieces have been created which seem to belong to another and much later age, to transport us at one step to the grave beauty of Greek work of the fifth century B.C. "This statuette excels in serene dignity, the Boston figure perhaps in grace and delicacy," says Mr. Wace elsewhere. The beauty and finish of the features of the small head make it all the more difficult to understand why other statuettes in marble have not been found in Cretan sites. The lack of good marble would explain the absence of many large works in the round, but it does not explain the paucity of small statuettes of this type. The Fitzwilliam statuette shows that technical difficulties would not have troubled Cretan artists.

The subject of the statuette has not been definitely settled. It may represent either a female votary or a goddess. She stands with her hands in front of her breasts, perhaps in an attitude of adoration. She cannot, according to Mr. Wace, be described as clasping her breasts, an attitude which would favour identification with a well-known type of oriental mother-goddess. Altogether, the costume and the absence of snakes rather favour the view that the statuette represents a votary, perhaps from a cult-group of a goddess with votaries.

Mr. Wace's principal interest in the present study is indicated by the sub-title of the book. He compares the costume with that shown by other Cretan figures and paintings, and with that shown in fresco fragments and on seals found on mainland sites such as Tiryns and Mycenae. From this he passes to a consideration of the textile materials employed and of the methods of using them. Possibly no aspect of Minoan civilization has so captivated popular imagination—or did so until fashions changed in recent years—as the extremely modern appearance of the low-cut, tight-fitting bodices, and the bell-shaped, flounced skirts of the Minoan ladies. Such costumes "demanded skilful cutters and good fitters." The skirts must have been cut along a curve on their lower edge, and Mr. Wace seems clearly right in his view that the patterned border found on some figures cannot, on this account, have been inwoven in the stuff, but must have been added separately after the skirt was cut. Similar considerations apply elsewhere. "In deciding whether a pattern is inwoven or applied in embroidery or some other way the cut and make of the garments must be taken into account." The material for the bodice of the statuette would be fine linen, perhaps with bindings of braid or gold, the apron was probably woven of wool and the skirt was probably



[Photograph by courtesy of the Cambridge University Press.]

of linen "ornamented with pleated flounces sewn on so as to be horizontal in front and to dip to a point in the centre of the back." Mr. Wace remarks that no attempt can yet be made to write the history of the evolution of costume; the examples must still be collected.

The book has been beautifully produced by the Cambridge University Press, and there are thirteen illustrative plates, including four plates showing the statuette (actual size), one of them in colours. These illustrations are the gift of a generous anonymous donor. The Fitzwilliam Museum is fortunate in having such collaborators as Mr. Wace and this anonymous benefactor.

S. W. GROSE.

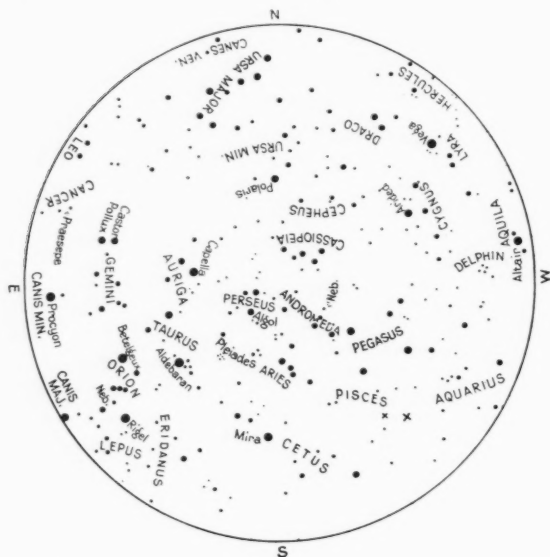
## Among the Stars: A Monthly Commentary.

By A. C. D. Crommelin, D.Sc., F.R.A.S.

*Late of the Royal Observatory, Greenwich.*

### THE FACE OF THE SKY FOR NOVEMBER.

JUPITER is the most conspicuous object in the early night sky; it is, however, excelled by Venus, which is resplendent as a morning star in Leo and Virgo. Venus is in elongation, 47 degrees from the sun, on the 21st; it then rises at 3 a.m. and appears as a half disc in the telescope. Mercury is also well



THE SKY AS SEEN FROM LONDON

at 2 h sidereal time, that is at 11 p.m., on November 6, at 10 p.m. on November 21.  
X x denote the positions of Jupiter and Uranus in mid-November.

placed as a morning star at the end of the month. Mira Ceti is now fading rapidly, but may still be seen with the naked eye. Orion is coming into a good position for observation. Its two leading orbs exemplify the two extreme types of stars—Betelgeux the cool red type M, Rigel the extremely hot bluish-white type B. The great nebula in Orion is an interesting spectacle with a low power. The great nebula in Andromeda is overhead early in the night, and easily visible to the naked eye. It is now believed to be another universe, so remote that its light takes a million years to reach us.

### The Transit of Mercury.

This event takes place on the morning of 10th November. Mercury enters on the sun at 3 h. a.m. and passes 2' south of its centre at 5 h. 46 m. a.m. The sun rises in London at 7 h. 8 m., and Mercury begins to pass off the disc at 8 h. 28 m. Its position is 73 degrees from the north point towards the west; that is, high right for a direct view, or low left in an inverted one. The planet's diameter is ten seconds; it will

be quite invisible without telescopic aid, using (of course) a dark glass. Observers should find the error of their clocks (by wireless signals or otherwise) and time the contacts, both internal and external, as accurately as possible. A point to examine is whether a bright ring can be seen round the portion of Mercury that has passed off the sun. This can be plainly seen in the case of Venus, proving the presence of an atmosphere, but it has never been seen with certainty in Mercury's case. There will not be another transit visible in the British Isles till 14th November, 1953. The 1940 transit occurs during our night. Transits of Mercury were important for establishing the forward motion of its perihelion point, which was one of the three astronomical tests of Einstein's theory of relativity. They are also important in another way. It is now suspected that the earth's rotation is subject to changes of rate; this can be tested by observations of the more rapidly moving heavenly bodies, and Mercury comes next after the moon in rapidity.

### Gale's Comet.

This comet was found by Mr. Walter F. Gale at Sydney on 7th June, while sweeping the sky with a binocular. It is his third cometary discovery; the others were made in 1894 and 1912. From observations made at the Cape and Johannesburg, extending up to 9th August, I have computed the following orbit: Perihelion passage June 14.44366, arc from node to perihelion  $209^{\circ} 32' 37''.79$ , node  $67^{\circ} 25' 39''.40$ , inclination  $11^{\circ} 47' 30''.47$ , perihelion distance 1.2164055, period 13.08917 years. The period shows that it belongs to the Saturn family of comets, of which only three were previously known—Peters's comet of 1846 (never seen again), Tuttle's comet, which appears every thirteen and a half years, and Neujmin's comet of 1913 (due back in 1931). In the present position of the orbit of Gale's comet, it is subject to larger disturbances from Jupiter than from Saturn. It approaches Jupiter's orbit within sixteen million miles in longitude  $53^{\circ}$ ; the least distance from Saturn's orbit is four times as great. It is noteworthy that of the four new comets found this year, three are British discoveries, viz., two in South Africa and one in Australia; the fourth was found in the United States. There are very few observers in the northern hemisphere now engaged in the systematic search for comets, so this is a most hopeful field for the patient amateur, who may look forward to success with confidence if he perseveres. Many begin the search but get quickly discouraged.

### Temperatures of the Giant Planets.

I wrote on this subject last month, but a point has since occurred to me that was raised by R. A. Proctor, in "Saturn and his System" about half a century ago. It is the persistence in latitude of the belts of Saturn, although its equator is inclined nearly 27 degrees to the plane of its orbit. If the atmospheric phenomena in Saturn were due to solar energy, we should certainly expect some sympathetic shift of the Saturnian cloud-belts while the sun wandered from  $26^{\circ}$  north to  $26^{\circ}$  south. I have studied a composite slide, made at the Lowell Observatory,

that gives photographs of Saturn at various degrees of opening of the rings, between 1909 and 1921; they range from ring widest to ring edgewise, but the equatorial bright belt shows no appreciable shift in latitude.

This to my mind is convincing evidence that the cloud belts are controlled by Saturnian energy; that the energy is deep-seated is shown by the drawing out of the markings into zones parallel to the equator, for they come from regions where the linear speed of rotation is less, and so are left behind. I think then that we may reject Dr. H. Jeffreys's suggestion of a mantle of ice thousands of miles thick enveloping the giant planets. On the contrary their surfaces, whatever may be their precise condition, are the seats of abundant energy, which profoundly affects the thick cloud layers above them.

#### Eclipse Expedition Results.

Reports of the results of the eclipse expeditions from various countries to the northern districts of Norway and Sweden are now coming to hand. The weather in these regions was, on the whole, very favourable, and the height of the sun and duration of totality were both considerably greater than in England. The party from Bergedorf obtained excellent photographs of the corona, which show an extension of fully a solar radius, which is considerably more than could be obtained in England owing to the shorter totality and the low altitude of the sun. The party from the Campidoglio Observatory, Rome, made observations of the illumination during totality, which was great enough to permit type half a millimeter to be read, while at night under a full moon a height of two millimeters was necessary.

But the light during totality was not mainly from the corona, but was diffused light from the sky; this was shown by the fact that a thick stick, held near a white sheet, threw no perceptible shadow upon it. The intensity of the light of the inner corona is much greater than that of the moon; but this inner corona is a narrow belt and the intensity of light falls off very rapidly, so that the whole light of the corona is less than that of the full moon.

#### The Next Eclipse.

The next observable total eclipse is on 9th May, 1929, visible in Sumatra, the Malay Peninsula and the Philippine Islands. An expedition will probably be sent from England to observe it. The eclipse of 21st October, 1930, is visible from the small island Niuafoou, between Fiji and Samoa. Then there is a favourable total eclipse on 31st August, 1932, visible in eastern Canada, and the north-eastern corner of the United States.

#### An Ancient Funeral Urn.

LAST month the discovery of an ancient funerary urn was described by a correspondent, what appeared to be a late Bronze or early Iron Age vessel having been unearthed during building operations at Slapton, South Devon. Additional particulars have since been received from Mr. W. B. Heygate, the owner of the property where the find was made, who states that the president of the Torquay Museum has since visited the site. A further search revealed at a depth of about three feet, two burial places, each comprising a structure formed of five stones. One of these was about a foot high, and has been removed for mounting in the museum. The other site, eighteen inches in height, had been disturbed, but both contained fragments of bones, as well as a quantity of bone ash.

## Book Reviews.

*Modern Eclipse Problems.* By F. J. M. STRATTON, D.S.O., M.A. Being the Halley Lecture for 1927. (Oxford University Press. 2s. 6d.).

An eclipse of the sun is usually of considerable popular interest, and a total eclipse is, in any one place, an event of such rarity as to provoke more than ordinary curiosity. The occurrence of a total eclipse of the sun in England this year has accordingly placed the reviewer, and no doubt many other astronomers, in the position of having to reply to the question, "What is the good of observing eclipses?" This question is commonly put in two different senses, in the one sense there is, to say the least, an intention to put the astronomer on the stand to defend his existence; and though one may be tempted by the feeling that blasting operations are inadequate to deal with this type of inquirer, yet so comprehensive and lucid is Col. Stratton's account of the interest of eclipses to present-day astronomers, that it may be recommended as a suitable reply to the question in this no less than in the other, and happily more frequent sense, of a sincere inquiry about astronomers' own reasons for observing eclipses.

Col. Stratton begins by reminding us of Halley's observations of the last total eclipses of the sun visible in England, one in 1715 when the sky was clear where Halley was, and one in 1724 when it was cloudy; and, remarking that the corona was not definitely shown to be a solar and not a lunar appendage until the successful application of photography to eclipse observations decided the matter in 1860, he goes on to discuss the outstanding and newly arisen problems of the nature and constitution of the corona. The methods of attacking these questions described by him are unexceptionable, but we think that perhaps greater stress might well have been laid on the importance of measurements of the relative intensities of the "coronium" lines at a given place in the corona; this seems to have been in the lecturer's mind but is scarcely expressed by him. The difficulty of finding any place for coronium in the periodic table, and the consequent inference that the source of the lines is rather an unknown state of common atoms than an unknown element is not mentioned by him.

The problems of the continuous spectrum of the corona and of the distribution of intensity of illumination over the corona, are next discussed and emphasis rightly laid on the need of measurements of polarization.

In the discussion of the observation of the spectrum of the chromosphere, the importance given to spectrophotometric determinations by modern researches, physical and mathematical, in spectroscopy and atomic structure, is demonstrated by the discussion of multiplet structure and the intensity of the Balmer series, for example, and the lecturer makes a tentative suggestion concerning the influence of pressure on the intensities in the Balmer series.

The lecturer points out the danger attending the careless interpretation of the word temperature, which does not always mean the same thing in different investigations. We should ourselves prefer to see the word restricted to the meaning it normally bears in the kinetic theory of gases, and desire to see a qualifying word or phrase attached when any other meaning is intended.

Other topics dealt with include the need for and point of further observations of the deflection of light passing near to

the limb of the sun (the test of Einstein's theory), the shadow bands, the prediction and observation of the circumstances of an eclipse, and the influence of an eclipse on the transmission of electro-magnetic waves.

There is added as an appendix a set of notes and a map for the guidance of observers of the eclipse of 1927 (29th June) in England. This must have been very useful, and our only regret is that, on account of the cloudy skies, so few people were able to see such a magnificent sight.

The printing of the book is excellent, and the illustrations are particularly well reproduced. There are a few trifling misprints, the corrections to them are quite obvious; and *in fine* let us say that Col. Stratton's chariot carries us on a well planned and balanced tour through most interesting territory.

J. A. CARROLL.

- (1) *Travels in Spain and the East, 1808-1810.* By SIR FRANCIS SACHEVERELL DARWIN. (Cambridge University Press. 6s.).
- (2) *Cruising Around the World and the Seven Seas.* By STANTON DAVIS KIRKHAM. (G. P. Putnam's Sons. Illustrated. 12s. 6d.).

(1) Anyone who even to-day chooses to go to a country engaged in war for a holiday, is entitled to our respect, however much we may question his wisdom. That Sir Francis Sacheverell Darwin chose to travel in Spain Portugal and the Mediterranean during the Peninsular War in the years 1808-1810 would therefore be proof enough of his pluck, even if his journal—reproduced from a transcript of Lady Darwin's copy of her husband's diary made by Mr. B. Ryle Smith, one of her grandsons, and edited by another, Mr. F. D. S. Darwin—did not serve to confirm it. Francis Darwin was the sixth son of the scientist and poet, Erasmus Darwin. In the tour described in these pages he was accompanied by Mr. Theodore Galton, uncle of the famous biologist Sir Francis Galton. Together they set sail from Falmouth on 26th November, 1808—the fare being twenty guineas each—and after a severe tossing in the Bay reached Corunna, their objective, at the end of four days. They were quickly in the thick of things. "Here we found everything in confusion from its vicinity to the Army which was at this time about 30 miles from the city, and it was with difficulty that we obtained even chairs to sleep upon at the *Leo d'Oro*." On moving to St. Jago they found that "Poor Mr. Clarke" (a companion on the ship out) had been robbed and murdered on arriving there the night before. Filthy Posadas, inadequate transport, and impassable roads accompanied them to Vigo and Oporto, where they found several hundred wounded English soldiers waiting to embark for home.

Lisbon, Cintra, Cadiz, Xeres, Seville, Gibraltar, and Granada saw the travellers each in turn. In March, in company with a Sir William Ingolby, they decided to cross to Africa. Here Sir Francis contracted sunstroke while waiting for permission to visit Fez. Returning to Tarifa in Spain "in an open Spanish bark with eight men who were intoxicated and carried a dangerous and heavy sail in honour of us as English," they proceeded to Malta, Constantinople, and the Isle of Greece. Anchoring in the harbour of Piraeus (24th February, 1810) they found "Lord Byron and Mr. Hobhouse visiting the remains of Grecian splendours" and all four went on together to Smyrna. England was eventually reached again on 8th August of the same year, but Sir Francis arrived alone. Galton had died of plague contracted in a Tunisian cotton vessel bound from Smyrna to Malta two months before. Travel was travel in

1810, and "Travels in Spain and the East" is a welcome little reminder of the fact.

(2) "I consider myself exceptionally fortunate in having lived at a time when modern conveniences of transport were already in existence, but had not yet produced their inevitable results. It is quite sufficiently obvious that national customs and national peculiarities are being smoothed out of existence by facilities of travel." So wrote Lord Frederic Hamilton in one of his delightful books of reminiscences, and thus does Mr. Stanton Davis Kirkham preface this volume. In practice it may be doubted whether they both mean quite the same thing. Thirty-four years ago Mr. Kirkham—as a fortunate young man—made a voyage round the world. The Grand Tour was then still an event. To-day it is no more than an incident, and, in covering the same ground again in 1923 the author notes the change. This book adds nothing to our stock of geographical knowledge. The author does not intend that it should. Indeed he describes it himself as "Random notes and considerations." He is, in fact, the born tourist, and unless they allow themselves to be prejudiced by the constant employment of the present tense, readers who demand no more will gladly become "born tourists" too. With him they will sail around Africa and South America, cruise in popular fashion in the Mediterranean, slip up the Nile to the Soudan; journey by motor through Tunisia and Algeria; go from Cape Town to the Victoria Falls and thence to Portuguese East Africa. Wherever they are, they will find him always at hand hurrying them on. He cannot help it. He knows there is so much to see and is so afraid that, if they dawdle, they will miss it. Nor for a moment can they feel ungrateful. They can—and will—however, feel a little breathless.

H. A. J. W.

- Ancient Persia and Iranian Civilization.* By CLEMENT HUART. The History of Civilization Series. (Kegan Paul. 12s. 6d.).

It is indeed surprising that M. Henri Berr should be able to say in his introduction to this volume that no work of this kind exists in France, and perhaps nothing of the kind could be found elsewhere. The literature dealing with specific subjects related to the history and culture of Ancient Persia is extensive, as anyone may see who consults the excellent bibliography appended to this volume; but of synthetic work little has been done. The subject is one of great difficulty, it is true, owing to the lack of direct written testimony. We only see the early history of Persia through the written records of other peoples or in the pages of the Avesta. That history is both interesting in itself, and of considerable importance in the growth of civilization both in the East and the West during the period covered by M. Huart. This was inevitable from the geographical position of Persia, by force of which it came to be at once a corridor and a connecting link between east and west—a position, indeed, which made it a dominant factor in the politics of the Middle East up to the early years of the present century. M. Huart, keeping in mind this factor, has attempted an evaluation of Persia's contribution to the history of civilization, tracing its history from the foundation of the first Empire by the Achaemenids, during the period when Hellenism permeated it under the Seleucids, in the age of the Parthians, and when the great expansion of art and culture under the Sassanids had made it a not unworthy rival of Byzantium. Magnificent as was the florescence of art in this last period, for us the religious and intellectual life of Persia is of even greater significance. Not only did it give rise to the



worship of Mithra, which all but overwhelmed Christianity; it was also the originator of heresies which played a great part in the early Christian Church; while the Iranian epic, of which M. Huart gives an account, in the persons of its heroes Jamshid and Rustam still lives in our own literature to-day.

E. N. FALLAIZE.

*Mediaeval London.* By MAJOR GORDON HOME, in collaboration with Mr. EDWARD FOORD. (Ernest Benn Limited. 18s.).

Mediaeval London was a city tingling with life. Its crafts and trade and commerce were making it both rich and famous. The paternal government of the Corporation and of the City Guilds stood for good organization. The patronage of kings and nobles and the generosity of rich merchants and citizens were filling the streets with noble churches and dignified houses. Life was busy but not dull. There were colour and pageantry and noise enough. There was adventure and there was romance. There was admixture, of course—tragedies with gaieties, marriage bells, plague and pestilence, murder most foul, and sudden death. There were common sense, sound judgment, quiet piety and wise benevolence. To study Mediaeval London is to study a chapter in the evolution of a city, to read a page in the development of our race and to scan a paragraph in the long, long story of human progress.

Major Gordon Home, having given to the public his volume on "Roman London," has now followed this work with a book on "Mediaeval London." He proposes a third contribution on our capital city to bring its story down to modern times. It will be welcomed. Major Home is a lover of London, and approaches his subject in a lover's spirit. He has gone to our chronicles for his history, to our archives for his facts, to our maps and paintings and engravings for his topography, and to our antiquities for his inspiration. His volume is based upon long research and study, and therefore it is a student's book. It is instinct with a love of the arts, and therefore it is an artistic book. It is full of sympathy, and therefore it is a very human book. It has imagination in the treatment, and so it is a very lively record of thrilling days and struggling times, and great achievements.

The spirit of the author, who groups (as life does) the little with the large, is well seen in his own words, when he writes:—"Of the marvellous colour, the architectural delights and the pageantry of great occasions one sees so much, if one have the gift of seeing, that it is almost possible, *after much study of the records*, to feel that one has lived in London long ago, when armour was still worn . . . when wandering pigs were a nuisance in the narrow, unlighted, and too often unpaved streets; when the Bridge was one of the wonders of Europe—a veritable marvel of stone and timber under which the tides rushed with the force of a mill-race."

Major Gordon Home's second volume on London is, in fact, a very welcome contribution to the literature on the subject. It gives the story of the City from the departure of the Romans to the coming of the Tudors. This is a thousand years of civic history, but it is truly more than our City's history which here unfolds, for London as the heart of England beats always to the throb of the nation's life. Saxon and Dane and Norman enter into London and leave their trace. Strong Edwards and weak Richards sit upon the throne in their palace at Westminster. Rival sovereigns come and go at the Tower of London, until Henry VI lies murdered in the Wakefield Tower Chapel there, next to which the Bloody Tower frowns, shortly afterwards, upon the lifeless forms of two poor Princes. Then cruel Richard reigns and Mediaeval England ends.

Working in collaboration with Mr. Edward Foord, Major Home has made most effective use of the abundant material available for the treatment of the Middle Ages as a whole. For the average Londoner he has provided a full and graphic account of the City. For the student he has given a useful summary of sources available for further and more detailed study, and has demonstrated the use to be made of them. The chronological table of events forms a very helpful appendix and an exhaustive index completes the volume.

The illustrations of "Mediaeval London" have been admirably selected. A large plan of London in the fifteenth century, together with a "Bird's-eye View of the City" (Braun and Hogenberg, 1560) accompany the book. The whole-plate photographs and the drawings in the text cover a wide field, and have been chosen upon such a careful plan that they form a very original collection of illustrations. They not only typify the period from various important view-points, but they also break fresh ground for the most part, having been happily selected from exceptional sources.

ALLEN WALKER.

*Sex and Repression in Savage Society.* By BRONISLAW MALINOWSKI. (Kegan Paul. 10s. 6d.).

Psycho-analytic theory has had a meteoric rise in popular favour and its formulation of the basic principles of human conduct has obtained a wide acceptance. When, however, the Freudians pass from the material with which they are familiar, the observations of the clinic and the practices, beliefs and habits of mind of the less developed in their own societies—the child, the peasantry and lower classes of a European population—and endeavour to apply the doctrine of the Oedipus complex to primitive and barbarous peoples, they become involved in a mass of fantastic argument which fails to carry conviction—at least to the anthropologist. The theory does not square with the facts. It is at once apparent that Freud's theory of a father-son antagonism arising out of a sexual conflict was formulated from a consideration solely of the patriarchal family organization as found among European peoples, and that when it is applied to a matrilineal family it is strained to breaking point. Dr. Malinowski, originally, as he acknowledges, inclined to favour Freud and his school, was the first to show how and where the Freudian theory required modification or even broke down when it was applied in the field to the actual behaviour of primitive peoples in their family and social relations. He has now carried the matter further.

In the brilliant studies which form the present volume, he not only shows that the very considerable variations in the constitution of the family throughout humanity entail parallel variations in the nuclear complex—the conflicts, passions, and attachments within the family—but, developing the theory of how the constitution of the family influences culture and society through the family complex, he passes on to a reconstruction of the origins of culture in which he outlines the changes which the animal nature of the human species must have undergone under the anomalous conditions imposed upon it by culture. In other words, while the Freudians maintain the persistence of a certain primitive urge, Dr. Malinowski argues that the instincts are plastic and are, as a matter of fact, moulded and organized in response to their familiar and social environment. Further, he joins issue with the Freudians on the character of these fundamental instincts. He does not agree that the basic instincts which underlie the mother-son and father-son relation are sexual. The incest tabu is not repressive but rather precautionary. Professor Malinowski states his case with the

greatest lucidity, and although his position is based upon his study of primitive peoples in the field, his conclusions apply equally to civilized and primitive alike. On its constructive side his work deserves the careful consideration of all who desire clear thinking in the application of psychological principles to the fundamental problems relating to education, the family, and social organization.

E. N. F.

*Will Civilization Crash?* By LT.-COMM. J. M. KENWORTHY, M.P. With an Introduction by H. G. WELLS. (Benn. 10s. 6d.).

Whatever may be thought of the author's examination of the present international situation, which leads him to foresee in present militaristic tendencies the downfall of civilization unless co-operative measures against war are taken, there is not the slightest excuse for the attack on America that Mr. Wells sees fit to make in his introduction. The true course of events at the recent Naval Disarmament Conference, with which he first deals, was difficult to follow among the mass of technicalities that obscured the main issues, and few would disagree with Mr. Wells' remarks about the outlook of the "naval monomaniacs" on either side of the water. But to proceed to tar all diplomatic action with the same brush, suggesting that the new American proposal for outlawing war is "probably the most vacuous treaty ever proposed," is to say the least a travesty of the position. The phrase also appears paradoxical having regard to Mr. Wells' own remedies for preventing war.

"They would be far more actively and intelligently at work against the war makers," Mr. Wells writes of supporters of the League of Nations, "if it did not exist to lull them into a false security." Yet after also saying that as a guarantee against

graver quarrels the League is "beneath contempt," he later concludes that "people who have made no effort to avert war cannot very well resist and grumble when through their tacit invitation war takes hold of them." Moreover, Mr. Wells advances no reasons for supposing that the "determination now of as many people as possible that they will have nothing to do with war"—the "most effective resistance"—should be any more guarantee than resolutions adopted by England and America or by the League. It casts quite unwarranted aspersion on international honour to assert that by making a treaty to outlaw war "you leave everything as it was before," and Mr. Wells cannot seriously believe that the relations between England and America at any rate will ever approach the "scrap of paper" atmosphere of pre-war Central Europe. The pessimism of this view is made complete when he admits that his own alternative remedy "is more likely to lead to jail."

As for "empty fruitless American 'idealism' utterly worthless to the world at large"—a disgraceful sneer unworthy of Mr. Wells—it may not be out of place here to instance the deep impression made on the crowds in Whitehall last month, as they saw the American Legion delegates lay a wreath of red poppies, made by British Legion disabled men, at the foot of the Cenotaph. For the reviewer the simple ceremony recalled some lines by Mr. Alfred Noyes which he saw a few days before sailing home from the States. They are written over the Princeton grave of the British and American officers who died fighting each other in the War of Independence.

"Here Freedom stood by stricken friend and foe;  
And 'ere the wrath paled or that sunset died,  
Looked through the ages; then with eyes aglow, aglow,  
Laid them to wait that future side by side."

J. A. B.

## Books Received.

- The Next Chapter: The War against the Moon.* By ANDRE MAUROIS. (Kegan Paul. 2s. 6d.).
- How to go to a Medium.* By E. J. DINGWALL, M.A. (Kegan Paul. 2s. 6d.).
- The Survival of the Unfittest.* By CHARLES W. ARMSTRONG. (The C.W. Daniel Company. 6s.).
- Spectroscopy.* By E. C. C. BALY, M.Sc., F.R.S. Vol. III. (Longmans, Green & Co. 22s. 6d.).
- Animal Ecology.* By CHARLES ELTON. (Sidgwick & Jackson Ltd. 10s. 6d.).
- The Foundations of Social Life.* By HENRY P. FAIRCHILD. (J. Wiley & Sons Ltd. 13s. 6d.).
- Scheherazade, or the Future of the English Novel.* By JOHN CARRUTHERS. (Kegan Paul. 2s. 6d.).
- Dialectic.* By MORTIMER J. ADLER. *Possibility.* By SCOTT BUCHANAN. (Kegan Paul. Companion volumes, each 10s. 6d.).
- In Search of our Ancestors.* By MARY E. BOYLE. (George G. Harrap & Co. 10s. 6d.).
- Land Tenure and Agricultural Production in the Tropics.* By H. MARTIN LEAKE, Sc.D. (W. Hefler & Sons, Ltd.). (7s. 6d.).
- The Psychology of Religion.* By J. CYRIL FLOWER, M.A., Ph.D. (Kegan Paul. 10s. 6d.).
- Political Pluralism.* By KUNG CHUAN HSIAO. (Kegan Paul. 10s. 6d.).
- The Antisterility Vitamine Fat Soluble E.* By HERBERT EVANS and GEORGE BURR. With the assistance of THEODORE L. ALTHAUSEN. *Memoirs of the University of California.* Vol. VIII. (University of California Press.)
- Weather Observations and Aids to Forecasting.* By DONALD W. HORNER, F.R.A.S., F.R. Met. Soc., Etc. (George Allen & Unwin Ltd. 2s. 6d.).
- Life in the Stars.* By SIR FRANCIS YOUNGHUSBAND, K.C.S.I., K.C.I.E. (John Murray. 10s. 6d.).
- History of Science Teaching in England.* By D. M. TURNER, M.A., B.Sc. (Lond.). (Chapman & Hall Ltd. 7s. 6d.).
- The Fundamentals of Astronomy.* By S. A. MITCHELL, Ph.D., LL.D., and C. G. ABBOT, M.Sc., D.Sc. (Chapman & Hall Ltd. 15s.).
- Trade.* By SIR ERNEST J. P. BENN. (Benn. 6d.).
- The Neurotic Personality.* By R. G. GORDON, M.D., D.Sc., F.R.C.P. Ed. (Kegan Paul. 10s. 6d.).
- The Guests of British Ants: Their Habits and Life-Histories.* By H. ST. J. K. DONISTHORPE, F.Z.S., F.E.S., etc. (George Routledge & Sons Ltd. 18s.).
- Architecture.* By A. L. N. RUSSELL, A.R.I.B.A. (Chatto & Windus. 7s. 6d.).
- The Control of the Mind: A Handbook of Applied Psychology for the Ordinary Man.* By ROBERT H. THOULESS, M.A., Ph.D. (Hodder & Stoughton. 5s.).
- Collected Physical Papers of Sir Jagadis Chander Bose, D.Sc., LL.D., F.R.S.* (Longmans, Green & Co. Ltd. 10s.).
- Propaganda Technique in the World War.* By H. D. LASSWELL. (Kegan Paul. 10s. 6d.).
- Art in Greece.* By A. DE RIDDER and W. DEONNA. (Kegan Paul. 21s.).
- The Initiate in the New World: A Sequel to The Initiate.* By "HIS PUPIL." (George Routledge & Sons Ltd. 7s. 6d.).
- The Story of Myths.* By E. E. KELLETT. (Kegan Paul. 7s. 6d.).
- Man's Origin.* By PROFESSOR SIR ARTHUR KEITH. (Watts & Co. 1s.).
- The Earth: Its Nature and History.* By EDWARD GREENLY, D.Sc., F.G.S. (Watts & Co. 1s.).

e later  
ert war  
ir tacit  
Wells  
ination  
nothing  
should  
ngland  
ranted  
making  
efore,"  
etween  
' scrap  
The  
ts that  
"

orthless  
of Mr.  
e deep  
nth, as  
of red  
foot of  
ecalled  
before  
Prince-  
ghting

glow,  
B.

C S.I.,  
URNER,  
,  
Ph.D.,  
& Hall

D.Sc.,  
stories.  
George

atto &  
chology  
M.A.,

D.Sc.,  
,  
SWELL.

Kegan  
nitiate.  
s. 6d.).  
s. 6d.).  
(Watts

EENLY,